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ABSTRACT

Part of a series of instructional materials for courses on graphic communication, this packet contains both teacher and student materials for seven units that cover the following topics: (1) offset press systems; (2) offset inks and dampening chemistry; (3) offset press operating procedures; (4) preventive maintenance and troubleshooting; (5) job ticket and cost awareness; (6) calculating paper cutting; and (7) binding and finishing. The teacher edition consists of the following elements: (1) introductory pages (a training and competency profile; a PrintEd Crosswalk that identifies competencies covered in the publication by unit number and objective, an instructional and task analysis, a reference sheet explaining the basic skills icons and classifications used in the guide, a basic skills matrix, and a tools, equipment and materials list); (2) teacher pages for each unit (suggested activities, answers to assignment sheets, written test with answers, learning activities sheet, transparency masters); and (3) page references to the student edition. The student edition includes objective sheets, information sheets, student supplements, assignment sheets, and job sheets. (KC)

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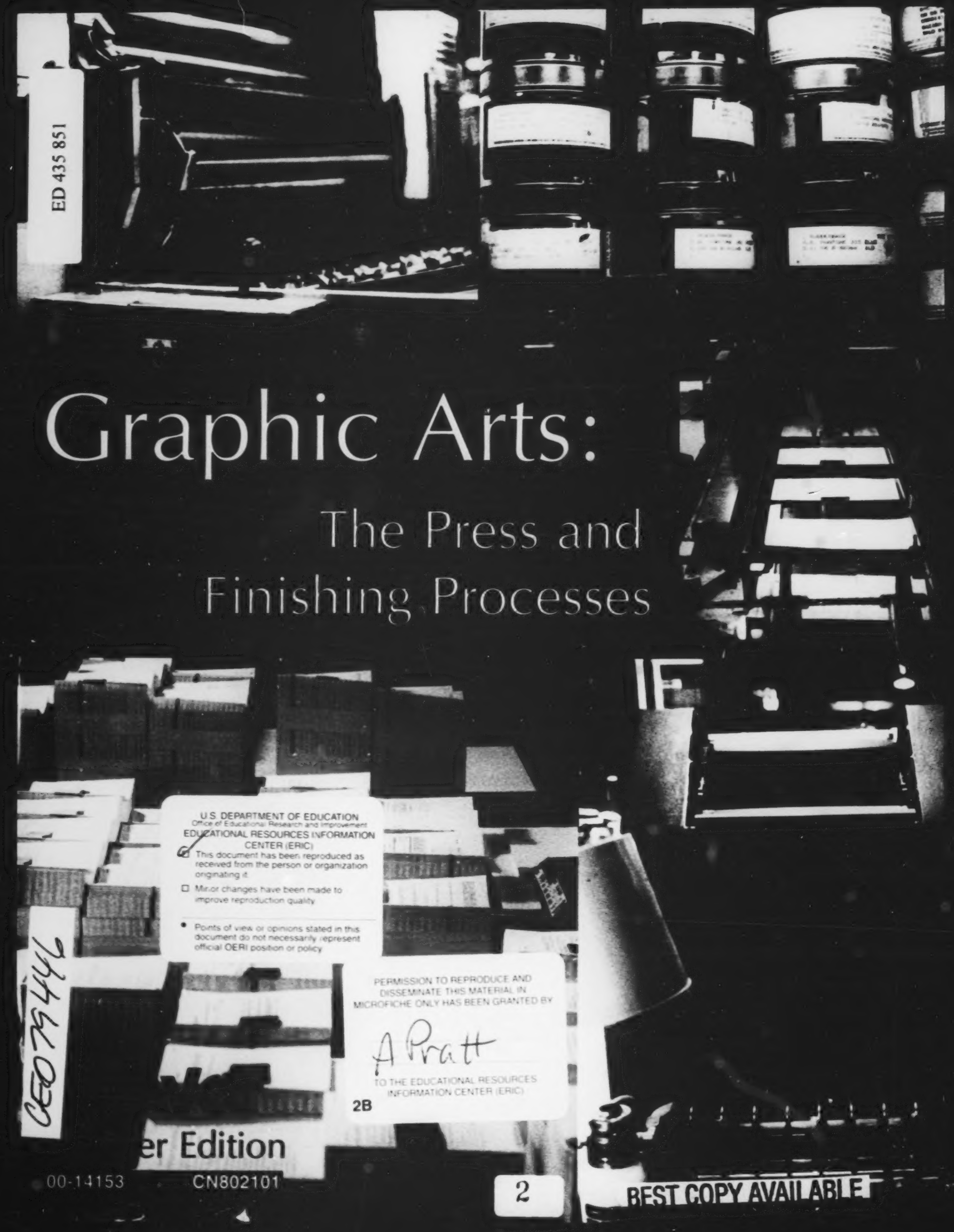

Graphic Arts:

The Press and Finishing Processes

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Graphic Arts

The Press and Finishing Processes

Fourth Edition

Teacher Edition

Revised by

Brett Jones

Project coordinated by

Cheryl Barr

Developed by

The Multistate Academic and Vocational Curriculum Consortium, Inc.

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Units of Instruction

Unit 1: Offset Press Systems

Unit 2: Offset Inks and Dampening Chemistry

Unit 3: Offset Press Operating Procedures

Unit 4: Preventive Maintenance and Troubleshooting

Unit 5: Job Ticket and Cost Awareness

Unit 6: Calculating Paper Cutting

Unit 7: Binding and Finishing

Foreword

Graphic Arts: The Press and Finishing Processes is the third in a series of instructional materials on graphic communication developed by the Multistate Academic and Vocational Curriculum Consortium (MAVCC). This publication addresses the new technologies that are changing the printing industry and introduces basic concepts and skills necessary for a student to be employed in an entry-level graphic communication occupation.

Additional publications in the graphic arts series are as follows:

- *Graphic Arts: Orientation, Composition, and Paste-Up*—Revision
- *Graphic Arts: Process Camera, Stripping, and Platemaking*—Revision
- *Graphic Arts: Electronic Prepress and Publishing*—New

Please contact us concerning the availability of these products.

MAVCC's graphic arts series aligns with the PrintED Accreditation Program administered through Printing Industries of America (PIA). A crosswalk is included aligning this publication with PrintED's press operations, advanced press operations, and finishing and binding tasks.

As you use these instructional materials, we hope that you will find that they contribute to the quality of your program. If any problems occur or if you have any suggestions for improvement of the materials, please call or write us.

Jim Fliehler, Chair
Board of Directors
Multistate Academic and
Vocational Curriculum
Consortium

Clark R. Harris
Executive Director
Multistate Academic and
Vocational Curriculum
Consortium

Acknowledgments

Well-deserved thanks go to the many industry and education representatives who participated as members of MAVCC's graphic arts committees throughout the years. Their assistance in developing and reviewing these instructional materials has been an essential step in MAVCC's development process.

Appreciation is also extended to those individuals who contributed their time and talent to the fourth revision of *Graphic Arts: The Press and Finishing Processes.*

1999 Participants

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Use of This Publication

Graphic Arts: The Press and Finishing Processes is available in both a teacher and student edition. The contents of these materials are tied to measurable and observable learning outcomes that were identified and validated by the graphic arts advisory committee, comprised of business/industry representatives and teachers. Competencies align with the PrintED task list developed by the Printing Industries of America, Inc. (PIA).

Teacher Edition

The complete teacher edition consists of introductory pages, teacher pages, and the student edition. Materials are loose-leaf and three-hole punched and are divided into units of instruction that may be broken into more than one lesson or class period. For added flexibility, each unit is individually numbered beginning with a T for teacher page, followed by the unit number and page number.

Example:

Page 17 of Unit 3 in the teacher pages are represented as T 3–17.

MAVCC—*Graphic Arts: The Press and Finishing Processes* T 3–17

Page 1 of Unit 5 in the teacher pages are represented as T 5–1.

MAVCC—*Graphic Arts: The Press and Finishing Processes* T 5–1

Pages in the student edition are numbered beginning with the unit number, followed by the page number.

Example:

Page 7 of Unit 5 in the student edition is represented as Page 5–7.

MAVCC—*Graphic Arts: The Press and Finishing Processes* Page 5–7

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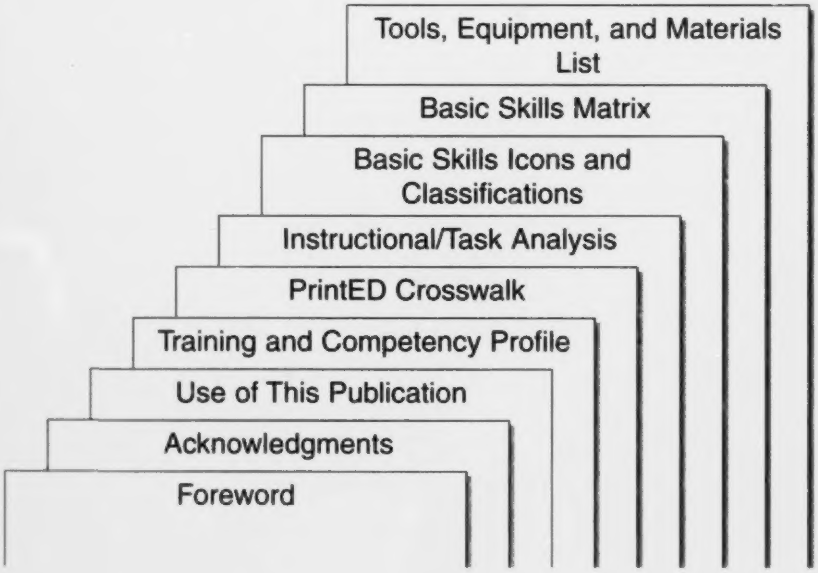
Use of This Publication

For group instruction, the teacher should determine the best way to teach each objective and allow for student participation. For self-paced or individualized instruction, students should be provided with opportunities to become involved in planning and being responsible for their own education. Careful study of each unit of instruction by the teacher will help to determine the following:

- amount of material that can be covered in each class period;
- supplies and materials required for assignment sheets and job sheets;
- resource people who must be contacted;
- supplementary materials to be ordered;
- skills that must be demonstrated and the amount of class time needed for demonstrations; and
- amount of class time needed for student practice and return demonstrations of mastered skills.

Teachers are encouraged to localize and personalize these materials to meet the needs of individual students, the community, and prospective employers.

Introductory Pages


Tools, Equipment, and Materials List
Basic Skills Matrix
Basic Skills Icons and Classifications
Instructional/Task Analysis
PrintED Crosswalk
Training and Competency Profile
Use of This Publication
Acknowledgments
Foreword

In addition to general information, such as the table of contents, acknowledgments, and the use of this publication, the following tools have been provided to assist administrators and teachers in planning for instruction.

☐ **Training and Competency Profile.** This form may be copied and used to record information about each student, such as enrollment dates, class attendance, and work experience, and to document the student's mastery of specific job competencies. It can also be used to provide information about the student's qualifications to potential employers and/or for entry into advanced training programs.

☐ **PrintED Crosswalk.** This document identifies the PrintED competencies covered in this publication and lists specifically where these skills are located by unit number and objective.

☐ **Instructional/Task Analysis.** This document provides a quick review of the contents of this publication by identifying the cognitive skills (what the student should know) and psychomotor skills (what the student should be able to do) addressed in each unit of instruction.

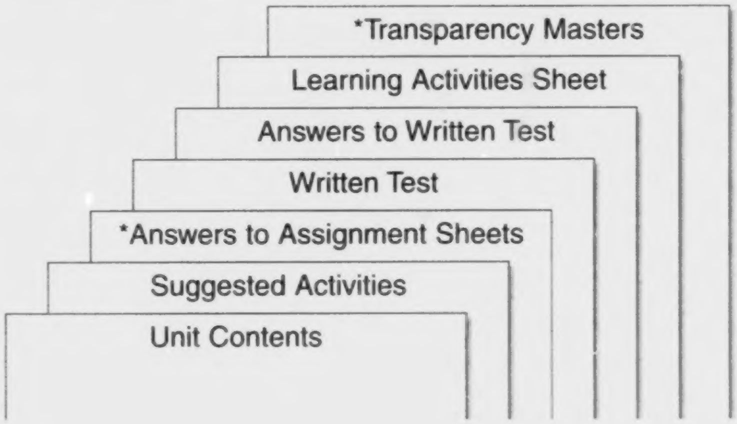
☐ **Basic Skills Icons and Classifications.** This page provides a reference guide of the graphic symbols that are used to identify the basic academic and workplace skills included in each assignment sheet and job sheet.

☐ **Basic Skills Matrix.** This document graphically summarizes the academic and workplace skills training included in the instructional materials. It should be helpful to teachers in planning for instruction, and to administrators as documentation that basic skills are being taught as part of the vocational training.

☐ **Tools, Equipment, and Materials List.** This document provides a comprehensive list of those items needed in a vocational program for students to complete training. It also can assist administrators and teachers in determining program costs.

Use of This Publication

Teacher Pages



*Designates components that may not appear in every unit of instruction

Teachers should study the teacher and student pages before introducing the unit, allowing enough time to obtain supplemental materials and to contact outside resource persons.

☐ **Suggested Activities.** This component assists teachers during the preparation stage of the teaching/learning process by providing an instructional plan, teaching suggestions, a list of references used in the development of each unit, and a list of suggested supplemental resources (books, posters, pamphlets, videotapes, computer software, and Internet sites) that may be used to enhance instruction.

Instructions for evaluating student performance on the assignment sheets and job sheets are also included in the suggested activities section. Teachers should select and discuss with students the rating scale that will be used.

☐ **Answers to Assignment Sheets.** An answer key is provided, when applicable, to assist the teacher in evaluating student performance on a given assignment.

☐ **Written Test.** This component provides criterion-referenced evaluation of every cognitive objective listed in the unit of instruction, and serves as both a pretest and posttest to assist teachers in measuring each student's competency gains. (Assignment sheet and job sheet objectives are not evaluated on the written test.) If the teacher has added, deleted, or modified any objectives, appropriate changes should be made to both the test and answers to the written test.

Tests may be divided into shorter tests covering three or four objectives at a time and given soon after those objectives have been covered. A selection of test items from the units covered may be used for a final test at the end of each term if desired. The written test is included in the teacher edition only and should be duplicated for student use.

☐ **Answers to Written Test.** An answer key is provided to assist the teacher in evaluating student performance on the written test.

☐ **Learning Activities Sheet.** This component provides a model for teachers to use in implementing a self-paced or individualized program, and guides the student through the required components in the student edition (objective sheet, information sheet, student supplements, assignment sheets, and job sheets). The teacher should modify the learning steps as needed to incorporate resources available in the classroom (videotapes, computer software, magazines, etc.) and to address instructional strategies that may be needed to enhance learning for each student. Final copies should be distributed for student use.

The following icons will be used on the learning activities sheet to denote steps that require additional resources:

📖 Read a book, magazine, or journal article

💻 Use a CBT program or other software application

🕸 Access a site on the World Wide Web

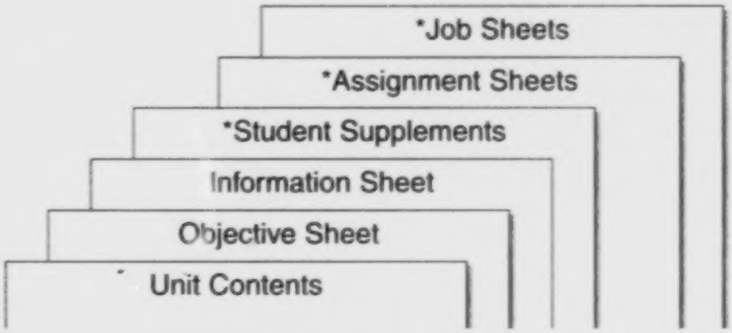
🖥 Look at PowerPoint® or other computer presentation

📼 Watch a videotape

☐ **Transparency Masters.** These overheads are used to direct the students' attention to the topic of classroom discussion. Transparencies allow the student to see as well as hear the information being presented, thus reinforcing the learning process. They may provide illustrations, charts, schematics, or additional information needed to clarify and reinforce objectives included in the unit of instruction. Some of these items may also appear with the appropriate objectives in the information sheet in the student edition. The teacher may make acetate copies from the masters or, in most cases, complete transparency sets are available for purchase.

Use of This Publication

Student Edition



*Designates components that may not appear in every unit of instruction

For best results, students should be provided with a copy of the student edition and should be allowed to take notes in the margins as additional information is provided by the instructor or as the student acquires additional information through library or Internet research.

☐ **Objective Sheet.** This component summarizes each unit for the student and teacher. The objective sheet is based on established performance objectives that state the goals for successful completion of a unit of instruction. Objectives are stated in two forms: unit objectives that state the expected performance of each student after completion of the unit and specific (enabling) objectives that state what the student must be able to do to reach the unit objective.

The objectives should be stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods.

Teachers should modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the teacher should remember to supply the needed information, assignment and/or job sheets, and criterion-referenced test items to cover the new objectives.

☐ **Information Sheet.** This component provides the student with the essential information for meeting the cognitive objectives in the unit. Teachers will find that the information sheet serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective. Students should read the information sheet before the information is discussed in class. Space is provided in the margins for students and teachers to add notes that clarify and/or expand upon the information presented.

- ☐ **Student Supplements.** This component is included in a unit of instruction when additional information is needed in order for students to complete one or more of the assignment and/or job sheets. Students are not directly tested over the information presented in a supplement; however, their ability to apply this information may be evaluated in the completion of assignment and/or job sheets.

- ☐ **Assignment Sheets.** The assignment sheets address the learning levels at or above the application level of Bloom's taxonomy. They provide students with an opportunity to use higher-order thinking skills, such as problem solving, synthesizing, analyzing, and evaluating. In addition, they may provide additional opportunities for students to develop their language skills.

  Assignment sheets can be paper-and-pencil activities, as well as those using computer software, videotapes, models, handouts, or other resources as appropriate. Criteria are provided to evaluate student performance objectively.

- ☐ **Job Sheets.** Job sheets are designed as skill tests and give the instructor direction as to the psychomotor skills to be taught, and provide the criteria to evaluate student performance objectively. They also help provide potential employers with a picture of the skills being taught during training and the performances that might be reasonably expected from an individual who has completed the training.

  The teacher should provide students with a copy of each job sheet and/or the procedure's manual and/or job specifications when necessary. The teacher should also discuss the equipment and materials that will be needed for the job and the criteria that will be used to evaluate the student's performance, and demonstrate the procedure prior to having students practice the procedure. Safety should be stressed as part of each demonstration.

  When a student is ready to be evaluated, the teacher should follow the instructions for evaluating student performance which may be found in the suggested activities component of the teacher unit.

As you use these instructional materials we hope that you will find that they contribute to the quality of your program. If any problems occur or if you have any suggestions for improvement of the materials, please write us at 1500 West Seventh Avenue, Stillwater, OK 74074-4364, or e-mail us at mavccweb@okvotech.org.

Training and Competency Profile

Student Information

Program ____________________ Instructor ____________________

Name ____________________ Soc. Sec. No. ____________________

Address ______________________________ Phone ______________

Grade ______________ School ______________________________

Allergies/Disabilities that might require special accommodation for training (please specify)

____

In case of emergency, contact ____________________ Phone ______________

Record of Enrollment

Date of Enrollment ____- ____- ____ Total Class Hours________ Total Hours Absent________

Date of Withdrawal ____- ____- ____ Total On-the-Job Training Hours________ Total Hours Tardy________

Date of Completion ____- ____- ____ Total Lab Hours__________

On-the-Job Training/Work Experience

____________________ ____________________
Place of Employment Address

____________________ ____________________
Supervisor's Name Phone

____________________ ____________________
Duration of Employment Job Title

____
Job Responsibilities

____________________ ____________________
Place of Employment Address

____________________ ____________________
Supervisor's Name Phone

____________________ ____________________
Duration of Employment Job Title

____
Job Responsibilities

Training and Competency Profile

Student Evaluation

Directions: Evaluate the student using one of the rating scales below. Write the appropriate number to indicate the degree of competency achieved. The descriptions associated with each of the numbers focuses on a level of student performance for each of the tasks listed. The written test scorelines are provided for optional teacher use. They may not be applicable in all cases.

Sample A

4 **Skilled**—Can perform job with no additional training.
3 **Moderately Skilled**—Has performed job during training program; limited additional training may be required.
2 **Limited Skill**—Has performed job during training program; additional training is required to develop skill.
1 **Unskilled**—Is familiar with process, but is unable to perform job.
0 **No Exposure**—No information or practice provided during training program.

Sample B

Yes—Can perform job with no additional training.
No—Is unable to perform job satisfactorily.

Unit 1: Offset Press Systems

_______ 1. Test the basic theory of offset printing.
_______ 2. ______________________________
_______ 3. ______________________________

Written Test Scores
Pretest Score _________%
Posttest Score _________%

Unit 2: Offset Inks and Dampening Chemistry

_______ 1. Conduct an ink cabinet inventory.
_______ 2. Conduct an inventory of offset press dampening chemistry.
_______ 3. Mix dampening solution and test for pH.
_______ 4. Mix PMS colors; conduct and evaluate an ink draw-down or smear.
_______ 5. Mix two colors of ink to produce a third color.
_______ 6. ______________________________
_______ 7. ______________________________

Written Test Scores
Pretest Score _________%
Posttest Score _________%

Unit 3: Offset Press Operating Procedures

_______ 1. Compare control features of offset and digital presses.
_______ 2. Set up the sheet control systems.
_______ 3. Set up the image control systems.
_______ 4. Operate an offset press from setup of systems through printed sheet delivery.
_______ 5. Rule up a sheet.
_______ 6. Perform a color wash on an offset press.
_______ 7. Print envelopes.
_______ 8. Change press from envelopes to letterhead.
_______ 9. Print a two-color, two-sided job.
_______ 10. Print a two-color duotone using an additional color head.
_______ 11. Print a work-and-turn.
_______ 12. Print a work-and-tumble.
_______ 13. Print halftones and screen tints.
_______ 14. Print solids.
_______ 15. Print using photodirect and/or electrostatic masters.
_______ 16. Print a four-color process job.
_______ 17. Perform perforation and scoring.
_______ 18. ______________________________
_______ 19. ______________________________

Written Test Scores
Pretest Score _________%
Posttest Score _________%

Unit 4: Preventive Maintenance and Troubleshooting

_______ 1. Use a troubleshooting guide to find the best solution to an ink and dampening problem.
_______ 2. Use a troubleshooting guide to find the best solution to a paper stock problem.
_______ 3. Use a troubleshooting guide to find the best solution to a registration problem.
_______ 4. Use a troubleshooting guide to find the best solution to a process problem.
_______ 5. Use a troubleshooting guide to find the best solution to a mechanical problem.
_______ 6. Determine lubrication requirements for a specific press.
_______ 7. Set up a preventive maintenance schedule in chart form.
_______ 8. Take an inventory of spare parts.
_______ 9. Adjust dampener rollers to plate cylinder.
_______ 10. Adjust ink form rollers to plate.
_______ 11. Adjust plate cylinder to blanket cylinder.
_______ 12. Adjust blanket cylinder to impression cylinder.
_______ 13. Change a molleton cover.
_______ 14. Degrease plate and impression cylinders.
_______ 15. Deglaze ink rollers and blanket.
_______ 16. Change blanket.
_______ 17. Backflush vacuum pump.
_______ 18. ______________________________
_______ 19. ______________________________

Written Test Scores
Pretest Score _________%
Posttest Score _________%

Unit 5: Job Ticket and Cost Awareness

_______ 1. Estimate costs of printing jobs.
_______ 2. ______________________________
_______ 3. ______________________________

Written Test Scores
Pretest Score _________%
Posttest Score _________%

Unit 6: Calculating Paper Cutting

_______ 1. Use the formula for cutting paper stock.
_______ 2. Use the formula to determine how many sheets will be required.
_______ 3. Calculate combination cut using stock cutting formula.
_______ 4. Draw a cutting diagram.
_______ 5. Cut carbonless paper.
_______ 6. ______________________________
_______ 7. ______________________________

Written Test Scores
Pretest Score _________%
Posttest Score _________%

Unit 7: Binding and Finishing

_______ 1. Pad 20-pound stock
_______ 2. Pad carbonless paper.
_______ 3. Drill paper stock for a 3-ring binder.
_______ 4. Fold paper using a folding machine.
_______ 5. Hand fold, collate, and staple a booklet.
_______ 6. Score a job.
_______ 7. ______________________________
_______ 8. ______________________________

Written Test Scores
Pretest Score _________%
Posttest Score _________%

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PrintED Crosswalk

The following PrintED tasks are covered in this publication. The first column identifies the PrintED task by name and number. The second column identifies the exact location by unit number and objective, assignment sheet, or job sheet number in this MAVCC publication unless otherwise noted.

For more information about PrintED, contact:

Printing Industries of America, Inc.
100 Daingerfield Road
Alexandria, VA 22314-2888

PrintED Press Operations Tasks	MAVCC Tasks
1. Read and comprehend production information from job ticket/jacket.	Unit 5, Objective 7—Components of a job ticket *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 3—Shop Organization
2. Identify safety considerations for platemaking. 3. Practice safe work habits in platemaking operations.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Objective 8—Do's and don'ts for properly handling plates and chemicals *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 2—Shop Safety
4. Identify basic parts of the platemaker.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Objective 2—Types of plate ends; Objective 3—Types of offset plates and their characteristics; Objective 4—Plate exposing devices
5. Identify basic parts of the photo direct or electrostatic platemaker.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 7—Expose a photodirect plate
6. Identify plate materials and plate types.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Objective 2—Types of plate ends; Objective 3—Types of offset plates and their characteristics
7. Identify processing chemicals and methods.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Objective 5—Types of presensitized plates and their characteristics; Objective 6—Gumming of plates

PrintED Crosswalk

PrintED Press Operations Tasks	MAVCC Tasks
8. Identify platemaking procedures for metal plates.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 1—Expose and develop a subtractive plate
9. Identify platemaking procedures for photo direct or electrostatic plates (masters).	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 7—Expose a photodirect plate
10. Determine exposure time for metal plates using transparent step scale and rub down test.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 2—Determine plate exposure using a step-off test
11. Prepare metal plates (expose, process and store).	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 1—Expose and develop a subtractive plate
12. Make additions, deletions and repairs to offset plate.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 6—Make plates for a two-color job
13. Make a plate using screen tints.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 5—Expose a plate when using a screen tint
14. Make a step/repeat using cutout or butterflies.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 3—Expose a step-and-repeat plate
15. Make a step/repeat using pin register system.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 4—Make a step-and-repeat plate using pin register system
16. Prepare a plate for multiple exposure on one side.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 5—Expose a plate when using a screen tint
17. Make plates for multi-color work.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 7, Job Sheet 6—Make plates for a two-color job
18. Identify safety considerations for press operation. 19. Practice safe work habits on duplicator operations.	Unit 3, Objective 2—Essential safety precautions *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 2—Shop Safety

PrintED Press Operations Tasks	MAVCC Tasks
20. Identify basic parts and systems of a press.	Unit 1, Objective 3—Basic systems of a typical sheet fed offset press; Objective 4—Functions of the basic systems of a typical sheet fed offset press
21. Identify basic press operation procedures.	Unit 3, Objective 4—Offset press operator control functions; Objective 5—Typical operator control features of offset press systems
22. Identify basic paper types and sizes. 23. Determine grain directions of paper.	*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 5—Paper
24. Handle and jog paper stock (wire/felt, watermarks, carbonless sequence).	Unit 6, Objective 3—Purpose of jogging paper before cutting; Job Sheet 1—Cut carbonless paper
25. Identify paper weight, coating and sizes.	*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 5—Paper
26. Identify paper problems: curling, etc.	Unit 4, Assignment Sheet 2—Use a troubleshooting guide to find the best solution to a paper stock problem
27. Identify offset ink types and uses.	Unit 2, Objective 4—Types of ink
28. Identify ink additives.	Unit 2, Objective 2—Main ingredients of offset inks
29. Identify ink problems.	Unit 2, Objective 13—Importance of ink-water balance Unit 4, Assignment Sheet 1—Use a troubleshooting guide to find the best solution to an ink and dampening problem
30. Describe a procedure to set up, mix and test ink for printing using ink color chart for mixing requirements.	Unit 2, Job Sheet 2—Mix PMS colors; conduct and evaluate an ink draw-down or smear; Job Sheet 3—Mix two colors of ink to produce a third color
31. Identify fountain solutions and additives.	Unit 2, Objective 9—Dampening solution ingredients and their functions
32. Identify mixed fountain solution testing materials, equipment and procedures.	Unit 2, Objective 10—Methods of measuring pH

PrintED Crosswalk

PrintED Press Operations Tasks	MAVCC Tasks
33. Mix fountain solutions using appropriate ratios.	Unit 2, Job Sheet 1—Mix dampening solution and test for pH
34. Makeready paper systems. 35. Makeready inking systems. 36. Makeready dampening systems.	Unit 3, Job Sheet 1—Set up the sheet control systems; Job Sheet 2—Set up the image control systems; Job Sheet 3—Operate an offset press from setup of systems through printed sheet delivery; Job Sheet 6—Print envelopes; Job Sheet 8—Print a two-color, two-sided job; Job Sheet 9—Print a two-color duotone using an additional color head; Job Sheet 10—Print a work-and-turn; Job Sheet 11—Print a work-and-tumble; Job Sheet 12—Print halftones and screen tints; Job Sheet 13—Print solids; Job Sheet 14—Print using photodirect and/or electrostatic masters; Job Sheet 15—Print a four-color process job; Job Sheet 16—Perform perforation and scoring
37. Print single color job using a metal plate.	Job Sheet 3—Operate an offset press from setup of systems through printed sheet delivery; Job Sheet 6—Print envelopes; Job Sheet 8—Print a two-color, two-sided job; Job Sheet 9—Print a two-color duotone using an additional color head; Job Sheet 10—Print a work-and-turn; Job Sheet 11—Print a work-and-tumble; Job Sheet 12—Print halftones and screen tints; Job Sheet 13—Print solids; Job Sheet 15—Print a four-color process job
38. Print single color job using photo direct and/or electrostatic masters.	Unit 3, Job Sheet 14—Print using photodirect or electrostatic masters
39. Print a single color job two-sided.	Unit 3, Job Sheet 10—Print a work-and-turn; Job Sheet 11—Print a work-and-tumble
40. Print a single color job on carbonless stock.	Unit 3, Job Sheet 3—Operate an offset press from setup of systems through printed sheet delivery
41. Print a single color job on envelopes.	Unit 3, Job Sheet 6—Print envelopes
42. Print a single color job on heavy stock.	Unit 3, Job Sheet 3—Operate an offset press from setup of systems through printed sheet delivery
43. Print a single color job work and tumble.	Unit 3, Job Sheet 11—Print a work-and-tumble

PrintED Press Operations Tasks	MAVCC Tasks
44. Print a single color job work and turn.	Unit 3, Job Sheet 10—Print a work-and-turn
45. Print a two color job on a duplicator without register marks.	Unit 3, Job Sheet 8—Print a two-color, two-sided job
46. Print a two color job using register marks.	Unit 3, Job Sheet 9—Print a two-color duotone using an additional color head
47. Print a two-color job with color bars.	Unit 3, Job Sheet 15—Print a four-color process job
48. Print a two-side/two color job.	Unit 3, Job Sheet 8—Print a two-color, two-sided job
49. Print a two color job on a duplicator using a T-head.	Unit 3, Job Sheet 9—Print a two-color duotone using an additional color head
50. Perform major cleanup and roller treatment.	Unit 4, Job Sheet 6—Degrease plate and impression cylinders; Job Sheet 7—Deglaze ink rollers and blanket
51. Make needed pressure settings on a press.	Unit 4, Job Sheet 1—Adjust dampener rollers to plate cylinder; Job Sheet 2—Adjust ink form rollers to plate; Job Sheet 3—Adjust plate cylinder to blanket cylinder; Job Sheet 4—Adjust blanket cylinder to impression cylinder
52. Install and set blanket on a press.	Unit 4, Job Sheet 8—Change blanket
53. Clean and secure duplicator for down time.	Unit 4, Job Sheet 6—Degrease plate and impression cylinders; Job Sheet 7—Deglaze ink rollers and blanket
54. Evaluate print quality and make needed adjustments to improve printed piece.	Unit 3, Job Sheet 3—Operate an offset press from setup of systems through printed sheet delivery; Job Sheet 6—Print envelopes; Job Sheet 8—Print a two-color, two-sided job; Job Sheet 9—Print a two-color duotone using an additional color head; Job Sheet 10—Print a work-and-turn; Job Sheet 11—Print a work-and-tumble; Job Sheet 12—Print halftones and screen tints; Job Sheet 13—Print solids; Job Sheet 14—Print using photodirect and/or electrostatic masters; Job Sheet 15—Print a four-color process job Unit 4, Objective 20—Guidelines for evaluating good print quality; Objective 21—Print quality problems and their causes

PrintED Crosswalk

PrintED Press Operations Tasks	MAVCC Tasks
55. Print close register color work.	Unit 3, Job Sheet 8—Print a two-color, two-sided job; Job Sheet 9—Print a two-color duotone using an additional color head; Job Sheet 15—Print a four-color process job
56. Print heavy solid work making needed adjustments to improve quality.	Unit 3, Job Sheet 13—Print solids
57. Observe a press operation at a commercial printer.	Unit 1, Unit 3—Teaching Suggestions

PrintED Advanced Press Operations Tasks	MAVCC Tasks
1. Read and comprehend production information from job ticket/jacket.	Unit 5, Objective 7—Components of a job ticket *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 3—Shop Organization
2. Identify safety considerations in press operations.	Unit 3, Objective 2—Essential safety precautions *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 2—Shop Safety
3. Identify the hand tools used in press operations.	
4. Identify the major and minor systems of the press.	Unit 1, Objective 3—Basic systems of a typical sheet fed offset press; Objective 4—Functions of the basic systems of a typical sheet fed offset press
5. Describe the operational procedures for each of the controls and adjustments on the press.	Unit 3, Objective 4—Offset press operator control functions; Objective 5—Typical operator control features of offset press systems
6. Identify different feeding systems.	Unit 1, Objective 7—Types of feeder systems and their operations
7. Identify different delivery, drying and dampening systems.	Unit 1, Objective 17—Types of dampening systems; Objective 20—Types of delivery systems and their descriptions
8. Describe the major systems of a web press.	
9. List the advantages and disadvantages of a web press.	
10. Identify and use a mechanical control of registration.	
11. Identify total pin registration systems.	
12. Identify mechanical press problems as they relate to quality control.	Unit 4, Assignment Sheet 5—Use a troubleshooting guide to find the best solution to a mechanical problem

PrintED Crosswalk

PrintED Advanced Press Operations Tasks	MAVCC Tasks
13. Select the proper stock according to job specifications.	*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 5—Paper
14. Jog and load stock.	Unit 7, Job Sheet 1—Pad 20-pound stock; Job Sheet 2—Pad carbonless paper
15. Prepare press chemistry. 16. Use and interpret Conductivity pH Meter.	Unit 2, Job Sheet 1—Mix dampening solution and test for pH
17. Set up, mix and test ink for printing using color chart for mixing requirements.	Unit 2, Job Sheet 1—Mix dampening solution and test for pH; Job Sheet 2—Mix PMS colors; conduct and evaluate an ink draw-down or smear
18. Print a job on lightweight paper.	Unit 3, Job Sheet 12—Print halftones and screen tints
19. Print a multi-color, 2-sided job on coated stock.	Unit 3, Job Sheet 8—Print a two-color, two-sided job
20. Print a process color job on uncoated paper. 21. Print a process color job on coated paper.	Unit 3, Job Sheet 15—Print a four-color process job
22. Print a job on card or board stock.	Unit 3, Job Sheet 12—Print halftones and screen tints
23. Print on a variety of paper finishes.	Unit 3, Job Sheet 12—Print halftones and screen tints Unit 3, Job Sheet 13—Print solids
24. Print a heavy solid coverage on coated stock.	Unit 3, Job Sheet 13—Print solids
25. Print a series of jobs using a variety of different impositions.	Unit 3, Job Sheet 10—Print a work-and-turn; Job Sheet 11—Print a work-and-tumble
26. Describe paper characteristics.	*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 5—Paper
27. Demonstrate a knowledge of varnishes and coatings.	Unit 2, Objective 4—Types of ink
28. Describe the advantages and disadvantages of waterless printing.	Unit 2, Objective 14—Characteristics of waterless printing

PrintED Advanced Press Operations Tasks	MAVCC Tasks
29. Describe perfecting and identify the primary gripper.	Unit 1, Objective 13—Offset press cylinder arrangements
30. Print a job containing a duotone.	Unit 3, Job Sheet 9—Print a two-color duotone using an additional color head
31. Demonstrate proper waste disposal methods.	Unit 2, Objective 7—Rules for ink care, storage, and disposal Unit 5, Objective 5—Waste management practices
32. Describe the difference between process and PMS color.	*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 8—Design Principles
33. Identify the common problems in color reproduction and describe the solutions.	Unit 4, Assignment Sheet 4—Use a troubleshooting guide to find the best solution to a registration problem
34. Describe the differences encountered in printing a process color job on coated and uncoated stock.	Unit 3, Job Sheet 15—Print a four-color process job
35. Interpret color bars on a press sheet to determine quality and corrective action if necessary.	Unit 3, Objective 1—Definition of color bar
36. Identify color densitometry principles and applications.	Unit 3, Student Supplement 1—Automated Advancements
37. Perform preventive maintenance.	Unit 4, Job Sheet 1—Adjust dampener rollers to plate cylinder; Job Sheet 2—Adjust ink form rollers to plate; Job Sheet 3—Adjust plate cylinder to blanket cylinder; Job Sheet 4—Adjust blanket cylinder to impression cylinder
38. Remove, replace and reset roller pressures.	Unit 4, Job Sheet 1—Adjust dampener rollers to plate cylinder; Job Sheet 2—Adjust ink form rollers to plate; Job Sheet 3—Adjust plate cylinder to blanket cylinder; Job Sheet 4—Adjust blanket cylinder to impression cylinder
39. Select and install plate and/or blanket packing. 40. Change the blanket.	Unit 4, Job Sheet 8—Change blanket

PrintED Crosswalk

PrintED Advanced Press Operations Tasks	MAVCC Tasks
41. Interpret and apply industry standards, such as SNAP, Gracol and SWOP.	Unit 3, Objective 21—Print quality problems and their causes Unit 4, Objective 20—Guidelines for evaluating good print quality
42. Describe and identify direct imaging technologies.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 8, Objective 2—Types of digital printing systems
43. List the advantages of plate scanning technology.	
44. Calculate percentages of density for press.	
45. Define the various types of digital printing and describe their advantages and disadvantages.	*Graphic Arts: Process Camera, Stripping, and Platemaking*, Unit 8, Objective 2—Types of digital printing systems

PrintED Crosswalk

This publication introduces students to basic finishing and binding tasks. Business and industry has indicated that they would rather students learn finishing and binding tasks on the job and focus on other graphic arts operating procedures in the classroom.

PrintED Finishing and Binding Tasks	MAVCC Tasks
2. Read and comprehend production information from job ticket/jacket.	Unit 5, Objective 7—Components of a job ticket *Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 3—Shop Organization
3. Identify safety considerations in bindery operations. 4. Practice safe work habits in bindery operations.	*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 2—Shop Safety
5. Identify basic hand tools in bindery. 6. Identify basic materials in bindery. 7. Identify basic equipment in bindery.	Unit 7, Job Sheet 1—Pad 20-pound stock; Job Sheet 2—Pad carbonless paper; Job Sheet 3—Drill paper stock for a 3-ring binder; Job Sheet 4—Fold paper using a folding machine; Job Sheet 5—Hand fold, collate, and staple a booklet; Job Sheet 6—Score a job
9. Use folding equipment to produce an accordion fold.	Unit 7, Job Sheet 4—Fold paper using a folding machine
16. Select and identify the most commonly used types of paper.	*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 5—Paper
19. Describe the fundamentals of saddle stitching and perfect binding.	Unit 7, Objective 2—Binding techniques
28. Describe various paper inventory and storage techniques. 29. Demonstrate proper handling techniques.	*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 5—Paper
32. Estimate the cost of materials and production for performing bindery operations such as cutting, scoring, folding, packaging and coating.	Unit 5, Assignment Sheet 1—Estimate costs of printing jobs
48. Describe binding processes and techniques.	Unit 7, Objective 2—Binding techniques
49. Set-up and demonstrate a 3-hole drill to produce a drill job.	Unit 7, Job Sheet 3—Drill paper stock for a 3-ring binder

PrintED Crosswalk

The following finishing and binding tasks are taken from PrintED's Introduction to Graphic Communications task list. The complete crosswalk for this task list can be found in *Graphic Arts: Orientation, Composition, and Paste-Up*.

PrintED Finishing and Binding Tasks	MAVCC Tasks
1. Identify operational and safety parts of a paper cutter.	Unit 6, Objective 2—Safety rules for operating a paper cutter
2. Identify grain direction of paper.	*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 5—Paper
3. Calculate basic paper cuts from stock sheet.	Unit 6, Assignment Sheet 1—Use the formula for cutting paper stock; Assignment Sheet 3—Calculate a combination cut using stock cutting formula
4. Draw a master cutting diagram for making cuts.	Unit 6, Assignment Sheet 1—Use the formula for cutting paper stock; Assignment Sheet 3—Calculate a combination cut using stock cutting formula; Assignment Sheet 4—Draw a cutting diagram
5. Make accurate paper cuts using a mechanized paper cutter.	Unit 6, Job Sheet 1—Cut carbonless paper
6. Identify basic paper types, weights, grades and classifications used in the printing industry.	*Graphic Arts: Orientation, Composition, and Paste-Up*, Unit 5—Paper
7. Identify padding equipment and hand tools. 8. Identify padding materials. 9. Produce correctly made pads of paper.	Unit 7, Job Sheet 1—Pad 20-pound stock; Job Sheet 2—Pad carbonless paper

Instructional/Task Analysis

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 1: Offset Press Systems

1. Terms and definitions
2. Basic theory of offset printing
3. Basic systems of a typical sheet fed offset press
4. Functions of basic systems of a typical sheet fed offset press
5. Components of the feeder system
6. Functions of the feeder system
7. Types of feeder systems
8. Components of the register system
9. Functions of components of the register system
10. Types of register systems
11. Components of the cylinder system
12. Functions of components of the cylinder system
13. Offset press cylinder arrangements
14. Components of a conventional inking system
15. Components of a conventional dampening system
16. Components of the inking/dampening system and their functions
17. Types of dampening systems
18. Components of the delivery system
19. Functions of components of the delivery system
20. Types of delivery systems
21. Test the basic theory of offset printing

Instructional/Task Analysis

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 2: Offset Inks and Dampening Chemistry

1. Terms and definitions
2. Main ingredients of offset inks
3. Three ink manufacturing procedures which benefit the user
4. Types of ink
5. Conditions influencing the performance of offset inks
6. Ink properties which affect the printing quality of offset inks
7. Rules for ink care, storage, and disposal
8. Purpose of offset dampening solutions
9. Dampening solution ingredients and their functions
10. Methods of measuring pH
11. Acceptable range of pH for a fountain solution
12. Effects of using alcohol or alcohol substitutes in a fountain solution
13. Importance of ink-water balance
14. Characteristics of waterless printing
15. Conduct an ink cabinet inventory
16. Conduct an inventory of offset press dampening chemistry
17. Mix dampening solution and test for pH
18. Mix PMS colors; conduct and evaluate an ink draw-down or smear
19. Mix two colors of ink to produce a third color

Unit 3: Offset Press Operating Procedures

1. Terms and definitions
2. Essential safety precautions
3. Reasons why efficient press operation is important
4. Offset press operator control functions
5. Typical operator control features
6. Steps in the sequence of paper movement through a typical offset press
7. Compare features of offset and digital presses
8. Set up the sheet control systems
9. Set up the image control systems
10. Operate an offset press from setup of systems through printed sheet delivery
11. Rule up a sheet
12. Perform a color wash on an offset press
13. Print envelopes
14. Change press from envelopes to letterhead

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 3: Offset Press Operating Procedures (continued)

15. Print a two-color, job two-sided
16. Print a two-color duotone using an additional color head
17. Print a work-and-turn
18. Print a work-and-tumble
19. Print halftones and screen tints
20. Print solids
21. Print using photodirect and/or electrostatic masters
22. Print a four-color process job
23. Perform perforation and scoring

Unit 4: Preventive Maintenance and Troubleshooting

1. Terms and definitions
2. Advantages of a routine, thorough preventive maintenance program
3. Areas of work in a preventive maintenance program
4. Preventive maintenance schedules
5. Requirements for a preventive maintenance schedule
6. Preventive maintenance procedures for daily cleanup
7. Preventive maintenance procedures for weekly cleanup
8. Preventive maintenance procedures for monthly cleanup
9. Procedures for daily, weekly, and monthly lubrication
10. Daily and weekly adjustment procedures
11. Monthly adjustment requirements
12. Steps in making an ink form roller check

Instructional/Task Analysis

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 4: Preventive Maintenance and Troubleshooting (continued)

13. Ink stripe configurations
14. Troubleshooting techniques
15. Categories of press troubles
16. Types of emulsification
17. Technique for avoiding emulsification
18. Conditions that create ink drying problems
19. Common ink troubles on the press
20. Guidelines for evaluating good print quality
21. Print quality problems

22. Use a troubleshooting guide to find the best solution to an ink and dampening problem
23. Use a troubleshooting guide to find the best solution to a paper stock problem
24. Use a troubleshooting guide to find the best solution to a registration problem
25. Use a troubleshooting guide to find the best solution to a process problem
26. Use a troubleshooting guide to find the best solution to a mechanical problem
27. Determine lubrication requirements for a specific press
28. Set up a preventive maintenance schedule in chart form
29. Take an inventory of spare parts
30. Adjust dampener rollers to plate cylinder
31. Adjust ink form rollers to plate
32. Adjust plate cylinder to blanket cylinder
33. Adjust blanket cylinder to impression cylinder
34. Change a molleton cover
35. Degrease plate and impression cylinders
36. Deglaze ink rollers and blanket
37. Change blanket
38. Backflush vacuum pump

Unit 5: Job Ticket and Cost Awareness

1. Terms and definitions
2. Fixed and variable costs of a printing job
3. Cost items to consider when giving an estimate of a printing job
4. Cost awareness factors for a successful printing business
5. Proper practices for waste management in the printing shop

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit 5: Job Ticket and Cost Awareness (continued)

Related Information: What the Student Should Know

6. Definition of a job ticket
7. Components of a job ticket
8. Printing trade customs

Application: What the Student Should Be Able to Do

9. Estimate costs of printing jobs

Unit 6: Calculating Paper Cutting

Related Information: What the Student Should Know

1. Terms and definitions
2. Safety rules for operating a paper cutter
3. Purpose of jogging paper before cutting
4. Types of paper cutters
5. Techniques for cutting carbonless paper
6. Formula for cutting paper stock
7. Formula for determining the number of sheets to be cut for a printing job
8. Formulas for making a combination cut

Application: What the Student Should Be Able to Do

9. Use the formula for cutting paper stock
10. Use the formula to determine how many sheets will be required
11. Calculate a combination cut using stock cutting formula
12. Draw a cutting diagram
13. Cut carbonless paper

Unit 7: Binding and Finishing

Related Information: What the Student Should Know

1. Terms and definitions
2. Binding techniques
3. Major folding styles
4. Processes associated with finishing activities

Application: What the Student Should Be Able to Do

5. Pad 20-pound stock
6. Pad carbonless paper
7. Drill paper stock for a 3-ring binder
8. Fold paper using a folding machine
9. Hand fold, collate, and staple a booklet
10. Score a job

Basic Skills Icons and Classifications

To assist teachers and students in identifying and documenting where academic and workplace skills are being taught, MAVCC has adopted a system that uses icons and a list of specific tasks to identify the skill or skills that are used in each assignment sheet and job sheet.

A matrix for each of the ten broad skill areas has been included in this edition and reflects key elements from *What Work Requires of Schools: A SCANS Report for America 2000,* a 1991 study by the U.S. Department of Labor; *Workplace Basics: The Skills Employers Want,* a three-year study conducted jointly by the American Society for Training and Development (ASTD) and the United States Department of Labor (DOL); and other national and state sources.

When an activity involving one of these basic skills is identified, the corresponding icon is placed on the assignment sheet and job sheet. Skills training is further defined by classifying specific skills that are required.

Each of the ten broad skill areas—reading, writing, mathematics, science, oral communication, interpersonal or relating, critical thinking, employability, social studies, and technology—is represented by the icon presented below.

Reading Skills

- Reading Comprehension
- Research/Reference
- Functional Reading

Writing Skills

- Language
- Composition
- Research
- Functional Writing

Math Skills

- Operation and Calculation
- Math Application
- Data Analysis and Display
- Functional Math

Basic Skills Icons and Classifications

Science Skills

- General Science
- Life Science
- Physical Science
- Earth Science

Oral Communication Skills

- Oral Presentation
- Listening
- Interactive Communication

Interpersonal or Relating Skills

- General Relating
- Teamwork/Cooperation
- Leadership/Influence

Critical Thinking Skills

- Cognitive Activities

Employability Skills

- Job Search/Selections
- Job Acquisition/Development
- Resource Management
- Job Safety

Social Studies Skills

- Information Analysis
- Social Studies Application
- Functional Social Studies

Technology Skills

- Selection
- Application
- Maintenance/Troubleshooting

Unit 1: Offset Press Systems

Academic and Workplace Skills

Obj. #	Objective	Icon	Skill	Sub Skill	Description
21	Test the basic theory of offset printing (J.S. 1)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Writing	Language	Use standard grammar, spelling, and capitalization; state ideas clearly
				Composition	Compose reports
			Science	Physical science	Investigate chemical properties
			Critical Thinking	Cognitive activities	Collect/record information; draw conclusions; predict results/outcomes

Basic Skills Matrix

Unit 2: Offset Inks and Dampening Chemistry

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
15	Conduct an ink cabinet inventory (A.S. 1)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Writing	Functional writing	Organizes information into an appropriate format
			Mathematics	Functional math	Perform/prepare an inventory
16	Conduct an inventory of offset press dampening chemistry (A.S. 2)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Writing	Functional writing	Organizes information into an appropriate format
			Mathematics	Functional math	Perform/prepare an inventory
17	Mix dampening solution and test for pH (J.S. 1)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations
18	Mix PMS colors; conduct and evaluate an ink draw-down or smear (J.S. 2)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Draw conclusions
19	Mix two colors of ink to produce a third color (J.S. 3)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Draw conclusions

Unit 3: Offset Press Operating Procedures

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
7	Compare control features of offset and digital presses (A.S. 1)	●	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		●	Writing	Functional writing	Organizes information into an appropriate format
		●	Critical Thinking	Cognitive activities	See relationship between two or more ideas, objects, or situations
8	Set up the sheet control systems (J.S. 1)	●	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		●	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations
		●	Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
		●	Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
9	Set up the image control systems (J.S. 2)	●	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		●	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations
		●	Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
		●	Technology	Application	Demonstrate the proper procedures for setting up and operating equipment

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Basic Skills Matrix

Unit 3: Offset Press Operating Procedures (continued)

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
10	Operate an offset press from setup of systems through printed sheet delivery (J.S. 3)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		?	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
			Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
11	Rule up a sheet (J.S. 4)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Mathematics	Functional math	Make measurements; use measuring device to construct lines
12	Perform a color wash on an offset press (J.S. 5)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		?	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations
			Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
13	Print envelopes (J.S. 6)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		?	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution

Unit 3: Offset Press Operating Procedures (continued)

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
14	Change press from envelopes to letterhead (J.S. 7)		Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
			Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
15	Print a two-color, two-sided job (J.S. 8)		Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
			Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
16	Print a two-color duotone using an additional color head (J.S. 9)		Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
			Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution

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Basic Skills Matrix

Unit 3: Offset Press Operating Procedures (continued)

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
17	Print a work-and-turn (J.S. 10)		Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
			Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
18	Print a work-and-tumble (J.S. 11)		Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
			Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
19	Print halftones and screen tints (J.S. 12)		Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
			Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
			Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment

Unit 3: Offset Press Operating Procedures (continued)

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
20	Print solids (J.S. 13)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
			Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
21	Print using photodirect and/or electrostatic masters (J.S. 14)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
			Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
22	Print a four-color process job (J.S. 15)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
			Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment

Unit 3: Offset Press Operating Procedures (continued)

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
23	Perform perforation and scoring (J.S. 16)	●	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		●	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
		●	Employability	Resource management	Demonstrate safe use of tools, equipment, and supplies
		●	Technology	Application	Demonstrate the proper procedures for setting up and operating equipment

Unit 4: Preventive Maintenance and Troubleshooting

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
22	Use a troubleshooting guide to find the best solution to an ink and dampening problem (A.S. 1)	📚	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		✎	Writing	Functional writing	Organizes information into an appropriate format
		💡	Critical Thinking	Cognitive activities	Define a problem; draw conclusions; devise a solution
23	Use a troubleshooting guide to find the best solution to a paper stock problem (A.S. 2)	📚	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		✎	Writing	Functional writing	Organizes information into an appropriate format
		💡	Critical Thinking	Cognitive activities	Define a problem; draw conclusions; devise a solution
24	Use a troubleshooting guide to find the best solution to a registration problem (A.S. 3)	📚	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		✎	Writing	Functional writing	Organizes information into an appropriate format
		💡	Critical Thinking	Cognitive activities	Define a problem; draw conclusions; devise a solution
25	Use a troubleshooting guide to find the best solution to a process problem (A.S. 4)	📚	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		✎	Writing	Functional writing	Organizes information into an appropriate format
		💡	Critical Thinking	Cognitive activities	Define a problem; draw conclusions; devise a solution

Basic Skills Matrix

Unit 4: Preventive Maintenance and Troubleshooting (continued)

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
26	Use a troubleshooting guide to find the best solution to a mechanical problem (A.S. 5)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Writing	Functional writing	Organizes information into an appropriate format
		?	Critical Thinking	Cognitive activities	Define a problem; draw conclusions; devise a solution
27	Determine lubrication requirements for a specific press (A.S. 6)		Reading	Reading comprehension	Analyze and apply what has been read to specific task; gain factual information
				Functional reading	Follow written instructions
			Writing	Functional writing	Organizes information into an appropriate format
28	Set up a preventive maintenance schedule in chart form (A.S. 7)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
			Writing	Functional writing	Organizes information into an appropriate format
		?	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions
29	Take an inventory of spare parts (A.S. 8)		Reading	Functional reading	Follow written instructions
			Writing	Functional writing	Organizes information into an appropriate format
			Mathematics	Functional math	Perform/prepare an inventory
30	Adjust dampener rollers to plate cylinder (J.S.1)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		?	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution

Unit 4: Preventive Maintenance and Troubleshooting (continued)

Academic and Workplace Skills

Obj. #	Objective	Icon	Skill	Sub Skill	Description
			Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up, adjusting, and operating equipment
				Maintenance/ troubleshooting	Perform maintenance on equipment
31	Adjust ink form rollers to plate (J.S. 2)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		?	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
			Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up, adjusting, and operating equipment
				Maintenance/ troubleshooting	Perform maintenance on equipment
32	Adjust plate cylinder to blanket cylinder (J.S. 3)		Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		?	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
			Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up, adjusting, and operating equipment
				Maintenance/ troubleshooting	Perform maintenance on equipment

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Basic Skills Matrix

Unit 4: Preventive Maintenance and Troubleshooting (continued)

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
33	Adjust blanket cylinder to impression cylinder (J.S. 4)	●	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		?	Critical Thinking	Cognitive activities	Transfer knowledge/training to new situations; draw conclusions; devise a solution
		●	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		●	Technology	Application	Demonstrate the proper procedures for setting up, adjusting, and operating equipment
				Maintenance/ troubleshooting	Perform maintenance on equipment
34	Change a molleton cover (J.S. 5)	●	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		●	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		●	Technology	Maintenance/ troubleshooting	Perform maintenance on equipment
35	Degrease plate and impression cylinders (J.S. 6)	●	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		●	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		●	Technology	Maintenance/ troubleshooting	Perform maintenance on equipment
36	Deglaze ink rollers and blanket (J.S. 7)	●	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		●	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		●	Technology	Maintenance/ troubleshooting	Perform maintenance on equipment

Unit 4: Preventive Maintenance and Troubleshooting (continued)

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
37	Change blanket (J.S. 8)	●	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		●	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		●	Technology	Maintenance/ troubleshooting	Perform maintenance on equipment
38	Backflush vacuum pump (J.S. 9)	●	Reading	Reading comprehension	Analyze and apply what has been read to specific task
				Functional reading	Follow written instructions
		●	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		●	Technology	Maintenance/ troubleshooting	Perform maintenance on equipment

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Basic Skills Matrix

Unit 5: Job Ticket and Cost Awareness

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
9	Estimate costs of printing jobs (A.S. 1)	●	Reading	Functional reading	Follow written instructions
		●	Mathematics	Operation and calculation	Perform basic computations
				Functional math	Apply computation skills as they are actually used on the job

Unit 6: Calculating Paper Cutting

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
9	Use the formula for cutting paper stock (A.S. 1)	📚	Reading	Functional reading	Follow written instructions
		🕒	Mathematics	Operation and calculation	Perform basic computations
				Math application	Select/apply mathematical formula
				Data analysis and display	Apply math principles to complete a drawing
				Functional math	Apply computation skills as they are actually used on the job
		💡	Critical Thinking	Cognitive activities	Evaluate alternatives; select alternative
10	Use the formula to determine how many sheets will be required (A.S. 2)	📚	Reading	Functional reading	Follow written instructions
		🕒	Mathematics	Operation and calculation	Perform basic computations
				Math application	Select/apply mathematical formula
				Functional math	Apply computation skills as they are actually used on the job
		💡	Critical Thinking	Cognitive activities	Evaluate alternatives; select alternative
11	Calculate a combination cut using stock cutting formula (A.S. 3)	📚	Reading	Functional reading	Follow written instructions
		🕒	Mathematics	Operation and calculation	Perform basic computations
				Math application	Select/apply mathematical formula
				Data analysis and display	Apply math principles to complete a drawing
				Functional math	Apply computation skills as they are actually used on the job
		💡	Critical Thinking	Cognitive activities	Evaluate alternatives; select alternative

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Basic Skills Matrix

Unit 6: Calculating Paper Cutting (continued)

Academic and Workplace Skills

Obj. #	Objective	Icon	Skill	Sub Skill	Description
12	Draw a cutting diagram (A. S. 4)		Reading	Functional reading	Follow written instructions
			Mathematics	Math application	Select/apply mathematical formula
				Data analysis and display	Apply math principles to complete a drawing
13	Cut carbonless paper (J.S. 1)		Reading	Functional reading	Follow written instructions
			Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies; observe safety rules
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment

Unit 7: Binding and Finishing

Academic and Workplace Skills

Obj. #	Objective	Icon	Skill	Sub Skill	Description
5	Pad 20-pound stock (J.S. 1)	📚	Reading	Functional reading	Follow written instructions
		⛑	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		⚛	Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
6	Pad carbonless paper (J.S. 2)	📚	Reading	Functional reading	Follow written instructions
		⛑	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		⚛	Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
7	Drill paper stock for a 3-ring binder (J.S. 3)	📚	Reading	Functional reading	Follow written instructions
		⛑	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		⚛	Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
8	Fold paper using a folding machine (J.S. 4)	📚	Reading	Functional reading	Follow written instructions
		⛑	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		⚛	Technology	Application	Demonstrate the proper procedures for setting up and operating equipment
9	Hand fold, collate, and staple a booklet (J.S. 5)	📚	Reading	Functional reading	Follow written instructions
		⛑	Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
		⚛	Technology	Application	Demonstrate the proper procedures for setting up and operating equipment

Basic Skills Matrix

Unit 7: Binding and Finishing (continued)

Academic and Workplace Skills					
Obj. #	**Objective**	**Icon**	**Skill**	**Sub Skill**	**Description**
10	Score a job (J.S. 6)		Reading	Functional reading	Follow written instructions
			Employability	Job safety	Demonstrate safe use of tools, equipment, and supplies
			Technology	Application	Demonstrate the proper procedures for setting up and operating equipment

Tools, Equipment, and Materials List

Abrasive cleaner
Adhesive perforation and scoring material
Adjustment wrench
Allen wrench
Blanket powder
Bond paper
Box end wrench
Carbonless paper
Chipboard
Chrome cylinder cleaner
Cleaner
Cleanup mats
Cleanup solvent
Cotton pads, clean
Dampening gauges, .005
Deglazer
Degreaser
Distilled water
Electronic pH meter
Envelope stock
Folding machine
Fountain solution
Ink knife
Ink scale
Installation sleeve
Jogging machine
Light table
Mixing containers and tools
Molleton cover, new
Offset blankets
Offset plates
Offset press
Offset press inks (various colors)
Operator manuals
Padding brush
Padding compound
Padding press
Paper stock (variety)
Paper cutter
Paper drill
Pen or pencil
pH test strips
Photodirect and/or electrostatic plates
Plate cleaner
Plate etch

Tools, Equipment, and Materials List

- PMS color formula guide
- Preservatives
- Press with additional color head
- Press with operator's manual
- Printed press sheet
- Roller conditioner-cleaner
- Ruler
- Scoring machine
- Screwdriver
- Shop towels
- Solvent/oil mixture
- Sponge rubber buffer
- Standard tools
- Stapler
- Standard tools for additional color head
- Talcum powder
- T-square
- Water miscible cleaner
- Wood block

Unit 1 Offset Press Systems

Unit Contents

Teacher Components

Teacher Page

Suggested Activities 1–3

Written Test 1–7

Answers to Written Test 1–19

Learning Activities Sheet 1–23

Transparency Masters

1—Basic Systems of a Typical Sheet Fed Offset Press 1–25
2—Components of the Feeder System 1–27
3—Components of the Register System 1–29
4—The Cylinder System 1–31
5—Offset Press Cylinder Arrangements 1–33
6—Offset Press Cylinder Arrangements (Continued) 1–35
7—Components of the Inking System 1–37
8—Components of the Dampening System 1–39
9—Types of Dampening Systems 1–41
10—Components of the Delivery System 1–43

Student Components

Student Page

Objective Sheet 1–3

Information Sheet 1–5

Student Supplement

1—Integrated Dampening Systems 1–21

Job Sheet

1—Test the Basic Theory of Offset Printing 1–23

Suggested Activities

Instructional Plan

Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resources" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.
- Make transparencies from the transparency masters included in this unit. These appear in the teacher edition only.

Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.

Suggested Activities

- Discuss and demonstrate the job sheet. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of this activity and the rating scale that will be used to indicate job performance.

Teaching Suggestions

- Demonstrate various components and systems of the offset press using your classroom or local job-shop press as an example.
- Demonstrate offset press systems by printing a job at slow speed.
- Invite manufacturers, industry representatives, and printing professionals to give demonstrations and/or describe products, equipment, and processes.
- Ask students to visit a print shop and prepare a report on the presses and systems observed.

Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.
- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.
- Evaluate the job sheet. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

  Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

Suggested Activities

Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

Sample A

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

Sample B

Yes—Can perform job with no additional training.
No—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

Resources Used in Developing This Unit

Print Media

- Bentley, R.G., J.C. Olson, C.E. Strandberg, and R.E. Wiper. *Graphic Communications Series: Transparency Originals.* Chicago: A.B. Dick Company.
- Cogoli, John E. *Photo Offset Fundamentals.* Old Tappan, NJ: Macmillan Publishing Co., Inc., 1986.
- Dennis, Ervin A., and John D. Jenkins. *Comprehensive Graphic Arts.* Old Tappan, NJ: Macmillan Publishing Co., Inc., 1983.
- Grimes, I.A., Jr. *Offset Printer*, Coordinator's Guide. Austin, TX: Instructional Materials Center, Division of Extension, The University of Texas at Austin, 1976.
- Hird, Kenneth F. *Offset Lithographic Technology.* Tinley Park, IL: Goodheart-Willcox Publisher, 1995.
- Spence, William P., and David G. Vequist. *Graphic Reproduction.* Westerville, OH: Glencoe McGraw-Hill, 1980.

Suggested Activities

Suggested Supplemental Resources

Print Media

- Destree, Thomas M. *The Lithographers Manual.* 9th ed. Pittsburgh, PA: Graphic Arts Technical Foundation, 1994. No. 1407

Electronic Media

- Videotapes
  - *Introduction to Small Press Operation.* No. 00PO44122
  - *The Sheetfed Offset Press.* No. 5050
  - *Sheetfed Press Dampening Systems.* No. 4221
  - *Sheetfed Press Inking Systems.* No. 4224

The above book and videotapes are available from:

Graphic Arts Technical Foundation
200 Deer Run Road
Sewickley, PA 15143-2600
Fax: 412-741-2311
Phone: 1-800-662-3916
http://www.gatf.org

Written Test

Name ____

Date ______________________________ Score __________

Objective 1

Match the terms with their definitions.

1. Delivery
2. Fountain solution
3. Infrared drying system
4. Ink
5. Offset
6. Offset press
7. Offset printing
8. Register
9. Register board
10. Vacuum

_____ a. In modern lithography, the procedure of transferring a right-reading image (plate cylinder) to an intermediate carrier (blanket cylinder) where it becomes wrong reading, then transferring that image to a receiver (paper stock) where it again becomes right reading

_____ b. To print the image in the exact same position on each sheet of paper

_____ c. The operation of an offset press in controlling the paper after the image is printed

_____ d. Suction created through the sucker tube(s) by a vacuum pump intake

_____ e. A flat surface on which the sheet of paper is positioned between the feeder and cylinder systems

_____ f. A chemical mixture applied to the nonimage areas of an offset plate to repel ink

_____ g. Dries ink quickly by using extreme heat

_____ h. The process of printing from a flat surface with the image and nonimage areas separated by ink/water chemistry

_____ i. A substance applied to the image areas of an offset plate for transfer to the blanket and then to the paper

_____ j. A piece of printing equipment which holds a roll or stack of paper, controls that paper through the process of imprinting an image on its surface by the offset method, and delivers the paper to a stack or roll for further processing

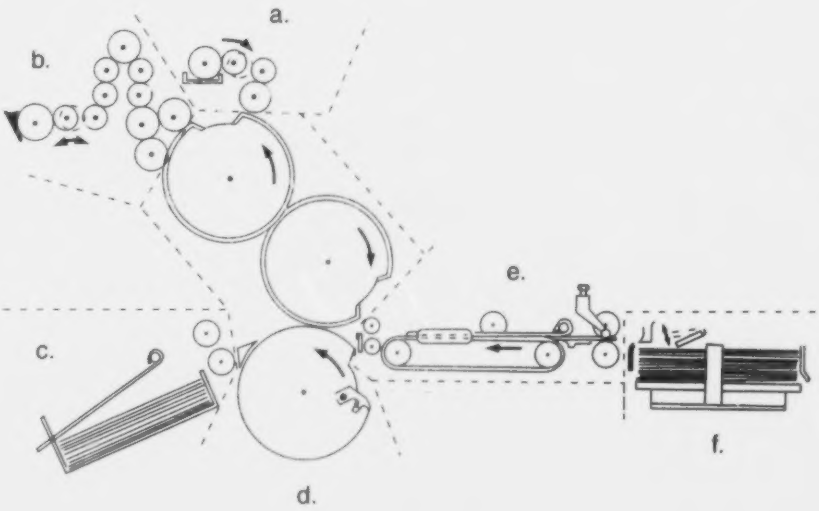
Written Test

Objective 2

State the basic theory of offset printing.

Objective 3

Identify the basic systems of a typical sheet fed offset press.



a. ______

b. ______

c. ______

d. ______

e. ______

f. ______

Objective 4

Match the basic systems of a typical sheet fed offset press with their functions. Functions continue on the next page.

1. Cylinder system
2. Dampening system
3. Delivery system
4. Feeder system
5. Inking system
6. Register system

_____ a. Controls the feeding of paper stock either from a roll or as a single sheet from a stack

_____ b. Controls the positioning of the paper being fed through the press so the image will print in the exact same position on each sheet

_____ c. Controls the paper after the image is printed by stacking to facilitate further processing

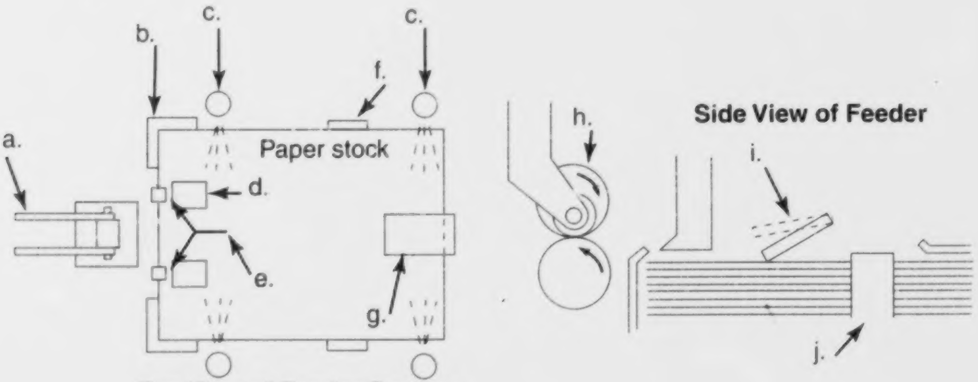
_____ d. A set of three cylinders (or their equivalent) which control the transfer of the image from the offset plate to the paper being fed through the press

_____ e. A reservoir (fountain) of ink and related rollers which control ink distribution to the image areas of the offset plate

_____ f. A reservoir (fountain) of dampening solution and related rollers which control dampening solution distribution to the nonimage areas of the offset plate

Objective 5

Identify the components of the feeder system.



Top View of Feeder System

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

g. ____________________

h. ____________________

i. ____________________

j. ____________________

Objective 6

Match components of the feeder system with their functions. Functions continue on the next page.

1. Air blast nozzle
2. Double sheet detector
3. Feed table
4. Paper guides
5. Pile height regulator
6. Pull out roller
7. Sheet separator
8. Vacuum-sucker tube

_____ a. A free turning roller which rotates in contact with a gear driven roller to pull the sheet of paper from the sucker tube(s) and deliver it to the register system

_____ b. Blows air from the discharge side of a vacuum pump through one or more tubes into the edges of the top few sheets of paper on the feed table to control sheet separation for pickup of a single sheet by the sucker tube(s)

_____ c. Small, thin, narrow, flexible metal finger which is positioned against the leading edge of the paper pile and has the tip end bent to fit over the top of the leading edge about 1/4"; it aids in the feeding of one sheet at a time by separating top sheet from a second or more sheets, which remain on top of the pile

_____ d. A device which automatically controls the height at which the pile of paper will be maintained for continuous feeding into the press

_____ e. Holds a stack or pile of paper in position for feeding into the press

_____ f. A moveable tube through which a vacuum pump draws air causing a sheet of paper to be drawn into contact with the tube, which then moves the sheet into the press

_____ g. A device which gauges the thickness of the paper before it is fed into the register system and provides a means of stopping or deflecting the paper if two or more sheets are picked up by the sucker tube(s)

_____ h. Position the sheets that are stacked on the feed table by holding the paper on the sides and at the leading and trailing edges in exact position for entering the press

Objective 7

Match the types of feeder systems with their operations.

Note: Answers may be used more than once.

1. Roll or web feed 2. Sheet feed 3. Stream feed

_____ a. Each sheet is picked up at the trailing edge and pushed underneath the previous sheet.

_____ b. The next sheet can be picked up immediately as the trailing edge moves toward the register system.

_____ c. Each sheet is picked up at the gripper edge after the trailing edge of the previous sheet moves past the sucker tubes.

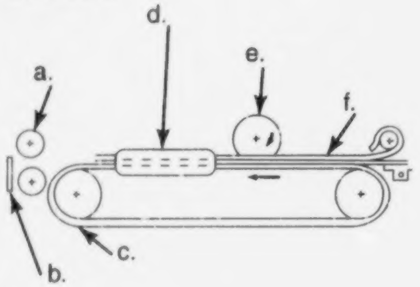
_____ d. Several overlapping sheets will be in position on the register board at one time.

_____ e. The paper is mounted as a roll on the feeder system and can be delivered from the press as single sheets or rewound as a roll.

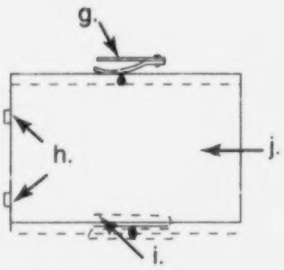
Objective 8

Identify the components of the register system.

Side View



Top View



a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

h. ______________________________

i. ______________________________

j. ______________________________

Objective 9

Match components of the register system with their functions.

1. Control wheel
2. Conveyor tapes
3. Feed roller
4. Fixed side guide
5. Jogger side guide
6. Paper stops
7. Sheet hold down strip

_____ a. Maintains paper in position to enter feed roller

_____ b. A thin, narrow flexible strip of metal the length of the register board which lies on top of a sheet of paper with a conveyor tape underneath to prevent sheet buckle

_____ c. Adjusts the tension on the sheet hold down strip

_____ d. A set of guides to stop the forward motion of the sheet of paper so it may be positioned by the side guides

_____ e. A set of tapes or tracks which lie flat on the register board, and rotate around the board to move the paper through the register system

_____ f. A free turning roller which moves in and out of contact with a gear-driven roller during each revolution of the press to move the sheet of paper from its register board position into the cylinder grippers

_____ g. Positions paper to correctly enter feed roller; adjusts to width of paper

Written Test

Objective 10

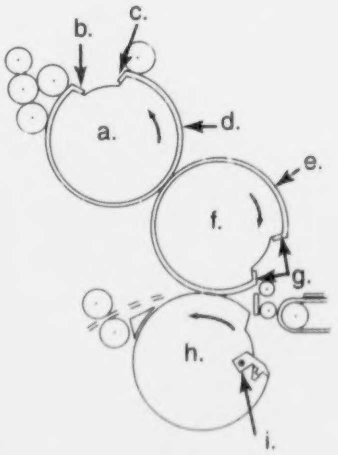
Name the two types of register systems.

a. ____________________

b. ____________________

Objective 11

Identify the components of the cylinder system.



a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

g. ____________________

h. ____________________

i. ____________________

Objective 12

Match the components of the cylinder system with their functions. Functions continue on the next page.

1. Blanket
2. Blanket clamps
3. Blanket cylinder
4. Head clamp/gripper clamp
5. Impression cylinder
6. Plate
7. Plate cylinder
8. Sheet grippers
9. Tail clamp

_____ a. The part of an offset press which contains a rubber blanket to receive the image from the plate

_____ b. Metal image-bearing surface which, treated with dampening solution and ink, imparts a printing image to the blanket roller

_____ c. The part of a plate cylinder which grips with pressure or holds the leading edge of the offset plate to secure its position on the cylinder

_____ d. Several metal fingers attached to a shaft on the impression cylinder which grip the leading edge of the sheet of paper as it passes through the cylinder system

_____ e. A thick sheet of rubber laminated to a backing sheet (usually canvas) that fits on the surface of the blanket cylinder

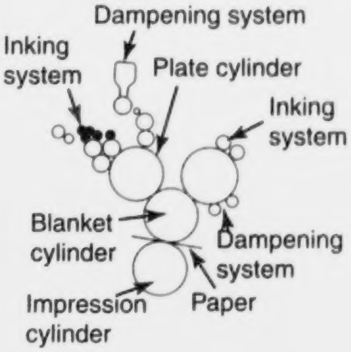
_____ f. The parts of the blanket cylinder which hold the blanket secure in position and around the cylinder

_____ g. The part of a plate cylinder which holds the trailing edge of the offset plate to secure its position on the cylinder

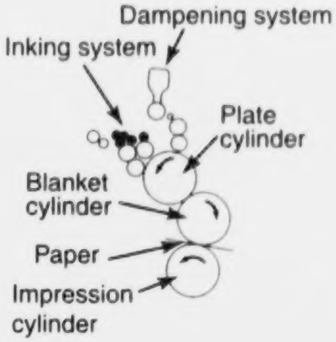
_____ h. The part of an offset press which applies pressure for image transfer to the paper

_____ i. The part of an offset press which holds the offset plate

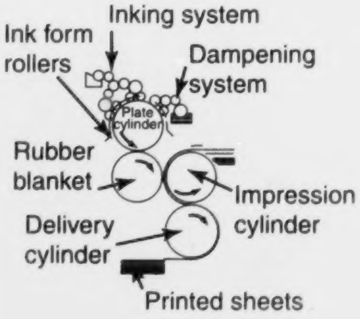
Objective 13 Identify offset press cylinder arrangements.


Dampening system
Inking system
Plate cylinder
Inking system
Blanket cylinder
Dampening system
Impression cylinder
Paper

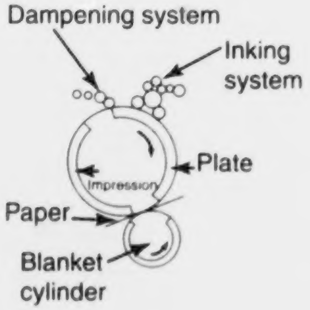
a. ______________________


Dampening system
Inking system
Plate cylinder
Blanket cylinder
Paper
Impression cylinder

b. ______________________


Inking system
Ink form rollers
Dampening system
Plate cylinder
Rubber blanket
Impression cylinder
Delivery cylinder
Printed sheets

c. ______________________


Dampening system
Inking system
Plate
Impression
Paper
Blanket cylinder

d. ______________________

Written Test

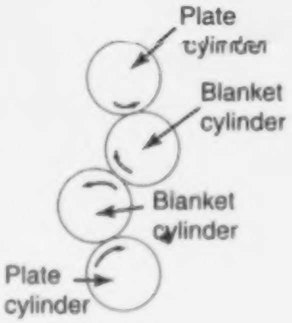


Plate cylinder
Blanket cylinder
Blanket cylinder
Plate cylinder

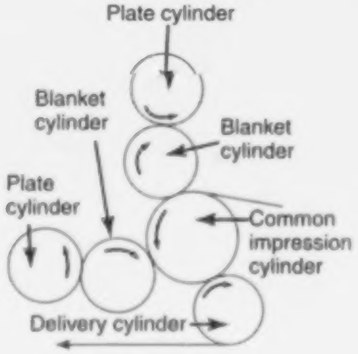


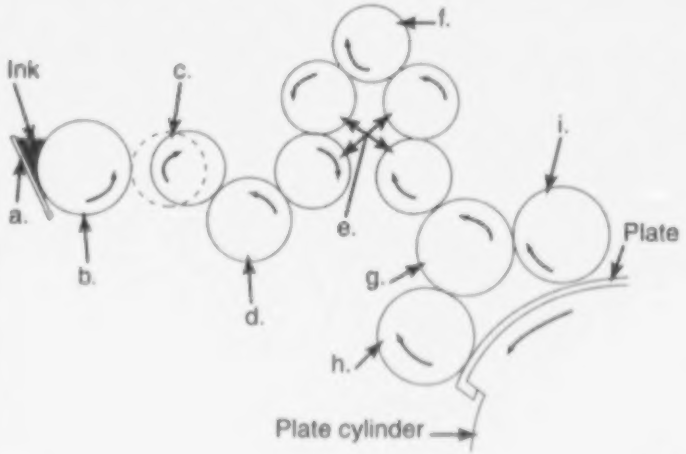
Plate cylinder
Blanket cylinder
Blanket cylinder
Plate cylinder
Common impression cylinder
Delivery cylinder

e. ______________________

f. ______________________

Objective 14

Identify the components of a conventional inking system.


Ink
a.
b.
c.
d.
e.
f.
g.
h.
i.
Plate
Plate cylinder

a. ______________________

b. ______________________

c. ______________________

d. ______________________

e. ______________________

f. ______________________

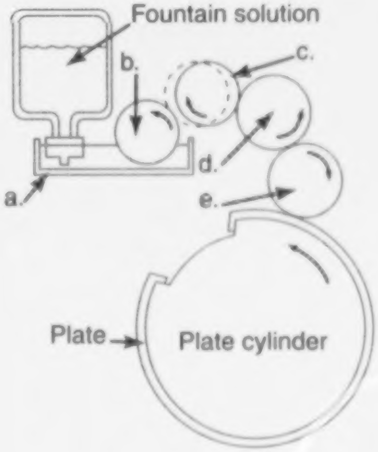
g. ______________________

h. ______________________

i. ______________________

Objective 15

Identify the components of a conventional dampening system.



a. ____________________ d. ____________________

b. ____________________ e. ____________________

c. ____________________

Objective 16

Match the components of the inking/dampening system with their functions.

1. Distributor roller
2. Ductor roller
3. Form roller
4. Fountain
5. Fountain roller
6. Idler roller
7. Vibrator roller

_____ a. A tray reservoir which holds a supply of ink or water (fountain solution)

_____ b. The roller which rotates in the ink and water fountains respectively to distribute ink and water to each of the systems

_____ c. Gear driven or free turning roller which rotates on its axis in contact with other rollers to aid in even distribution of water and ink in the respective systems

_____ d. The ink and/or dampening roller which makes contact with the offset plate while it is attached to the plate cylinder

_____ e. A free turning roller which contacts other ink rollers to aid in ink distribution

_____ f. The intermediate roller which carries ink or water from the respective fountain roller to each system

_____ g. A hard surface free-turning roller which moves back and forth on its axis while rotating in contact with other rollers in the ink or water system to evenly distribute the ink or water

Written Test

Objective 17

Distinguish between the two types of dampening systems by placing a "C" before descriptions of conventional systems and an "I" before descriptions of integrated systems.

Note: Both systems may apply to one description.

_____ a. Noncovered rollers

_____ b. Common ink and water form roller(s) contacting the plate

_____ c. Molleton covered rollers

_____ d. Paper or cloth sleeve covered rollers

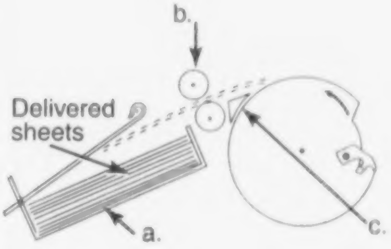
_____ e. Separate ink and water form rollers contacting the plate

_____ f. Separate ink and water fountains

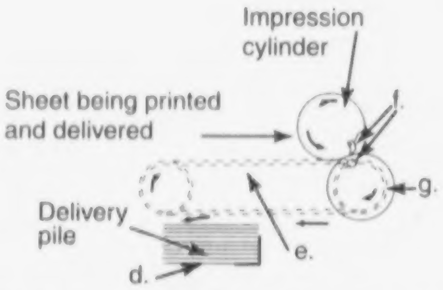
_____ g. Parchment covered rollers

Objective 18

Identify the components of the delivery system.


b.
Delivered sheets
a.
c.

Tray Delivery


Impression cylinder
Sheet being printed and delivered
f.
g.
Delivery pile
e.
d.

Chain Delivery With Receding Stacker

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

Objective 19

Match the components of the delivery system with their functions.

1. Delivery cylinder
2. Delivery gripper bars
3. Delivery gripper chains
4. Ejector rollers
5. Receding stacker
6. Receiving tray
7. Stripping finger

_____ a. A tray with positioning guides which receives the sheet from the cylinder system and holds the paper in a straight stack

_____ b. A set of gripper fingers mounted on two parallel chains which rotate to pick up the sheet of paper from the cylinder grippers and deliver it to a receiving tray or stacking unit

_____ c. Revolving chains with mounted gripper bars which transfer the sheet of paper from the cylinder system to a receiving table

_____ d. Metal finger which is positioned close to the surface of the impression cylinder which prevents the sheet of paper from following the cylinder rotation after the sheet is released to the delivery system

_____ e. Rollers which aid in removing the sheet of paper from the impression cylinder and delivering it to the receiving unit

_____ f. A receiving table attached to the offset press which automatically lowers as sheets of paper are delivered to it

_____ g. Delivers sheet of paper to stack in receiving tray

Objective 20

Match the types of delivery systems with their descriptions.

1. Chain
2. Chute with receding stacker
3. Tray

_____ a. Paper is delivered to a receiving tray which must be emptied frequently.

_____ b. Paper is delivered by gripper bars revolving on chains to a table which lowers automatically, allowing many sheets to be stacked.

_____ c. Paper is delivered and positioned on a table which lowers automatically.

***Permission to duplicate this test is granted.**

Answers to Written Test

Objective 1

a. 5
b. 8
c. 1
d. 10
e. 9
f. 2
g. 3
h. 7
i. 4
j. 6

Objective 2

The chemical principle that ink and water do not readily mix

Objective 3

a. Dampening system
b. Inking system
c. Delivery system
d. Cylinder system
e. Register system
f. Feeder system

Objective 4

a. 4
b. 6
c. 3
d. 1
e. 5
f. 2

Objective 5

a. Double sheet detector
b. Front paper guide
c. Air blast nozzle
d. Vacuum-sucker tube
e. Sheet separators
f. Side paper guide
g. Back paper guide
h. Pull out rollers
i Pile height regulator
j. Feed table

Objective 6

a. 6
b. 1
c. 7
d. 5
e. 3
f. 8
g. 2
h. 4

Objective 7

a. 3
b. 3
c. 2
d. 3
e. 1

Answers to Written Test

Objective 8

a. Feed roller
b. Paper stop
c. Conveyor tape
d. Jogger side guide
e. Control wheel
f. Sheet hold down strip
g. Fixed side guide
h. Paper stops
i. Jogger side guide
j. Paper sheet

Objective 9

a. 4
b. 7
c. 1
d. 6
e. 2
f. 3
g. 5

Objective 10

a. Register board
b. Feeder/buckle

Objective 11

a. Plate cylinder
b. Tail clamp
c. Head clamp/gripper clamp
d. Plate
e. Blanket
f. Blanket cylinder
g. Blanket clamps
h. Impression cylinder
i. Sheet gripper

Objective 12

a. 3
b. 6
c. 4
d. 8
e. 1
f. 2
g. 9
h. 5
i. 7

Objective 13

a. Two-color common blanket cylinder
b. Three cylinder
c. Four cylinder
d. Two cylinder
e. Perfector (blanket to blanket)
f. Two-color common impression cylinder

Objective 14

a. Ink fountain
b. Ink fountain roller
c. Ink ductor roller
d. Ink distributor roller
e. Ink idler rollers
f. Ink vibrator roller
g. Ink vibrator roller
h. Ink form roller
i. Ink form roller

Answers to Written Test

Objective 15

a. Water fountain
b. Water fountain roller
c. Water ductor roller
d. Water vibrator roller
e. Water form roller

Objective 16

a. 4
b. 5
c. 1
d. 3
e. 6
f. 2
g. 7

Objective 17

a. C, I
b. I
c. C
d. C
e. C
f. C, I
g. C

Objective 18

a. Receiving tray
b. Ejector rollers
c. Stripping finger
d. Receding stacker
e. Delivery gripper chains
f. Delivery gripper bars
g. Delivery cylinder

Objective 19

a. 6
b. 2
c. 3
d. 7
e. 4
f. 5
g. 1

Objective 20

a. 3
b. 1
c. 2

Prerequisites:
None

Learning Activities Sheet

Student Name ____

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 and 2.

☐ 4. **Observe** Demonstration of procedures to be used in completing Job Sheet 1.

☐ 5. **Do** Job Sheet 1, "Test the Basic Theory of Offset Printing."

☐ 6. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 7. If the evaluation is not satisfactory, study Objective 2 and the procedure outlined in Job Sheet 1 and repeat step 5.

☐ 7. **Study** Information Sheet, Objectives 3 through 13.

Optional

☐ 8. **Interview** Three press operators at your local print shop to learn about possible career opportunities.

☐ 9. **Study** Information Sheet, Objectives 14 through 20, and Student Supplement 1.

☐ 10. **Check** With instructor for any additional assignments to be completed.

☐ 11. **Do** Additional assignments listed below.

____

____

____

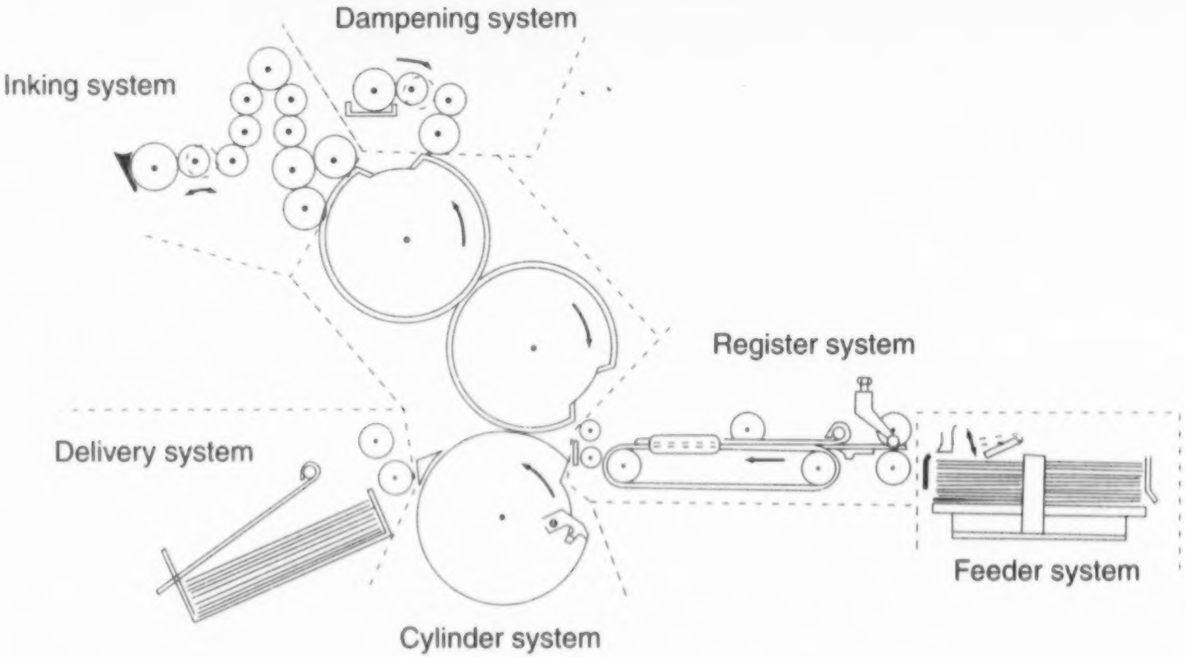
Learning Activities Sheet

☐ 12. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

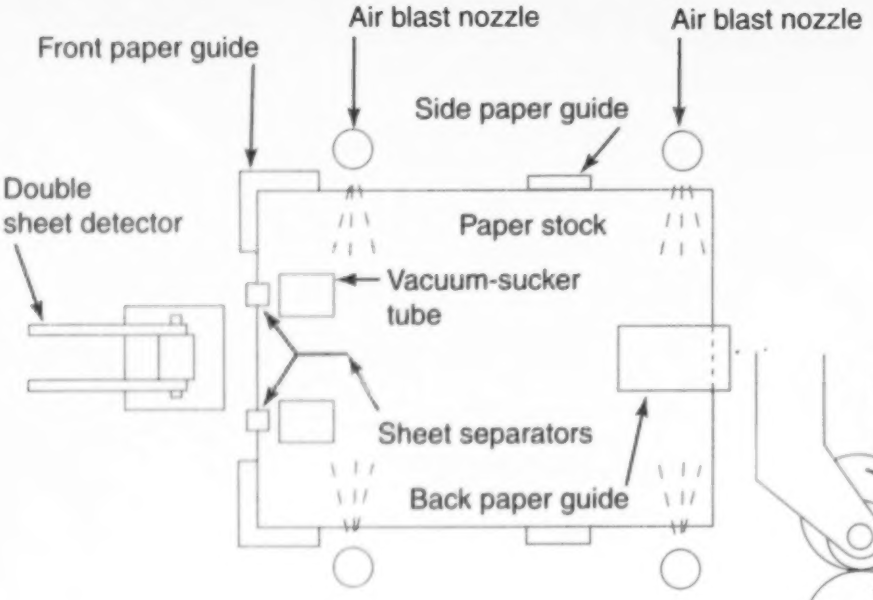
☐ 13. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

***Permission to duplicate this form is granted.**

Basic Systems of a Typical Sheet Fed Offset Press

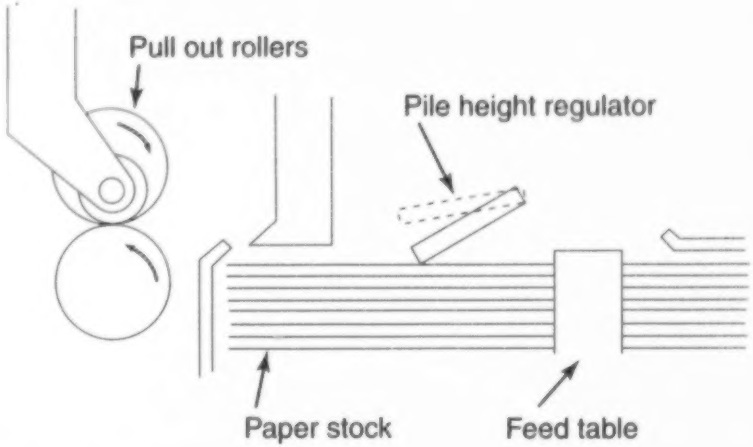

Dampening system
Inking system
Register system
Delivery system
Feeder system
Cylinder system

Components of the Feeder System

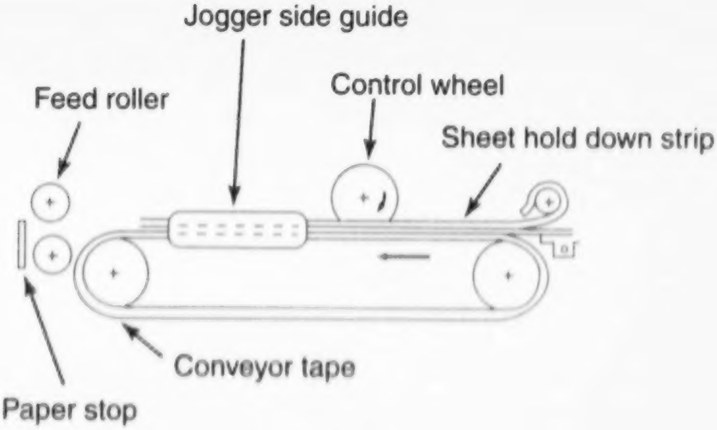

Front paper guide
Air blast nozzle
Air blast nozzle
Side paper guide
Double sheet detector
Paper stock
Vacuum-sucker tube
Sheet separators
Back paper guide

Top View of Feeder System

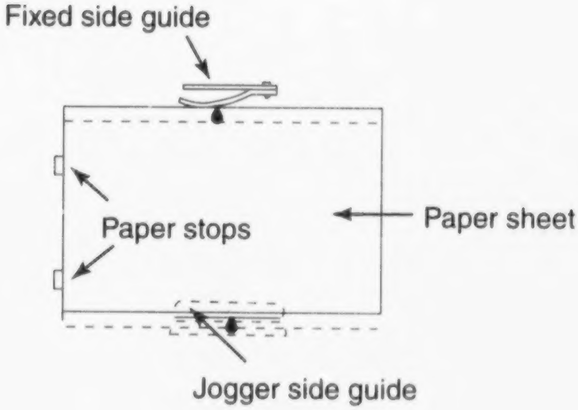
Side View of Feeder


Pull out rollers
Pile height regulator
Paper stock
Feed table

Components of the Register System

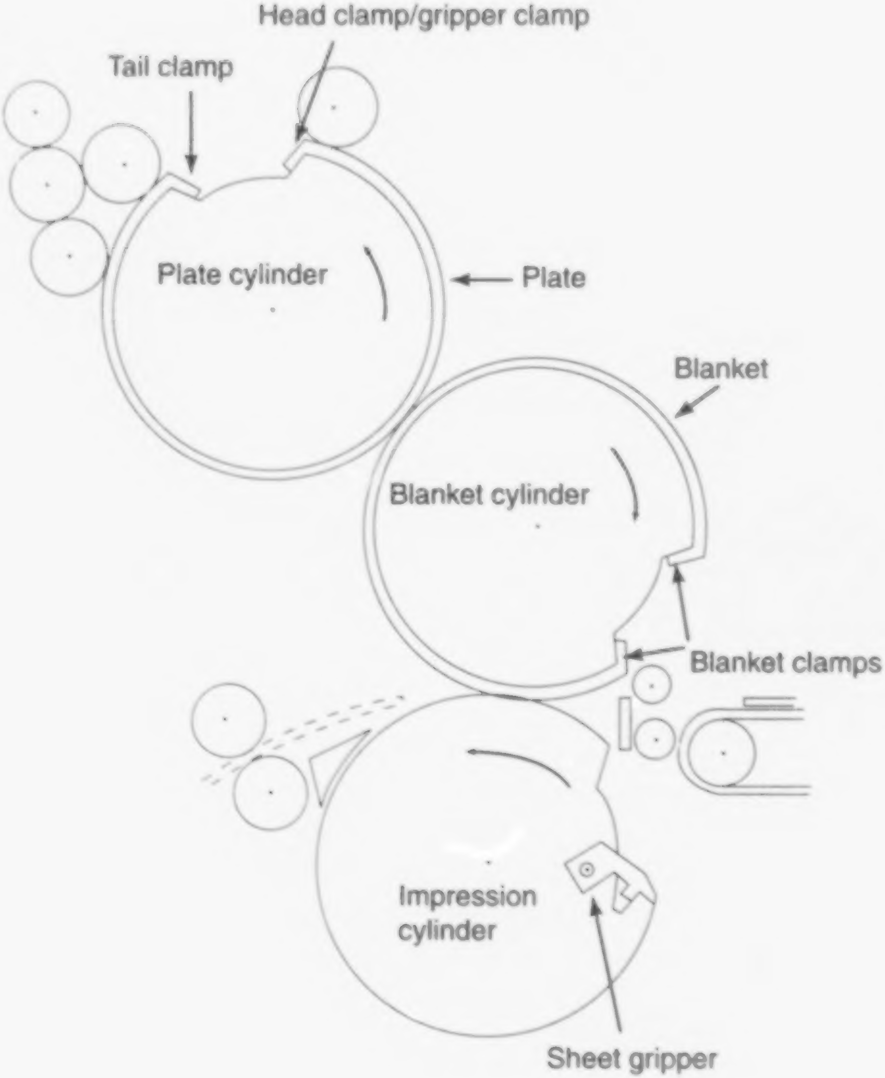

Jogger side guide
Feed roller
Control wheel
Sheet hold down strip
Conveyor tape
Paper stop

Side View

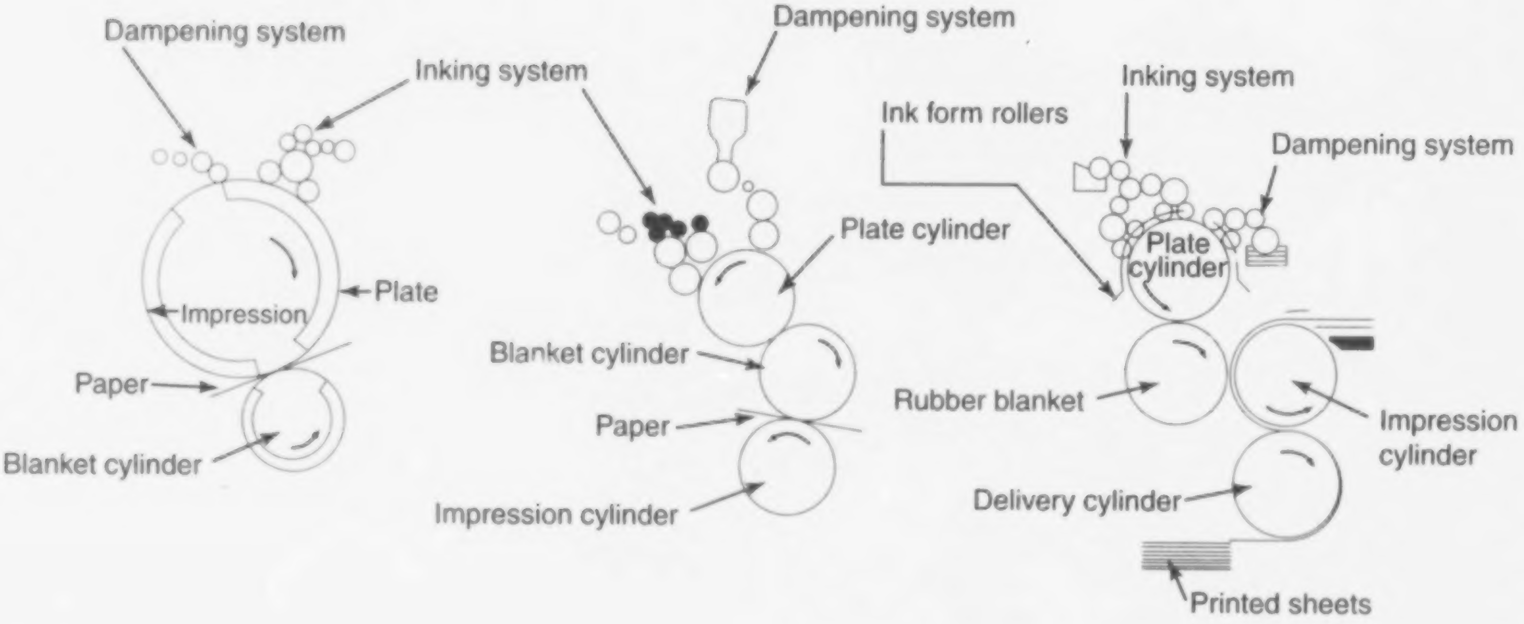

Fixed side guide
Paper stops
Paper sheet
Jogger side guide

Top View

The Cylinder System


Head clamp/gripper clamp
Tail clamp
Plate cylinder
Plate
Blanket
Blanket cylinder
Blanket clamps
Impression cylinder
Sheet gripper

Offset Press Cylinder Arrangements


Dampening system
Inking system
Plate
Impression
Paper
Blanket cylinder
Dampening system
Inking system
Plate cylinder
Blanket cylinder
Paper
Impression cylinder
Ink form rollers
Inking system
Dampening system
Plate cylinder
Rubber blanket
Impression cylinder
Delivery cylinder
Printed sheets

Two Cylinder **Three Cylinder** **Four Cylinder**

Offset Press Cylinder Arrangements (Continued)

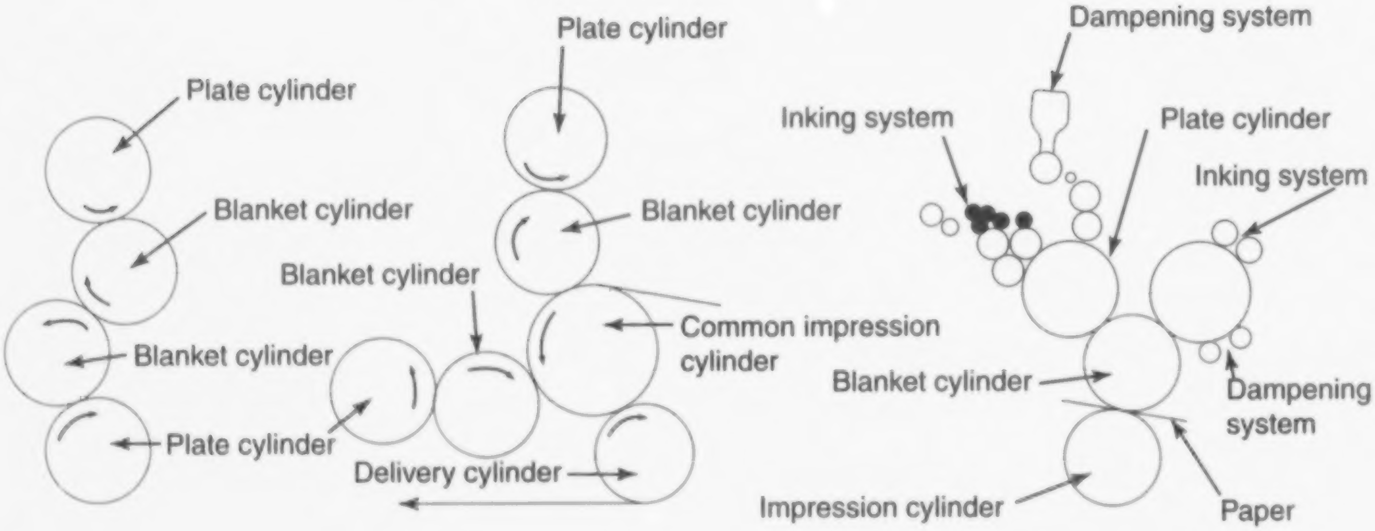


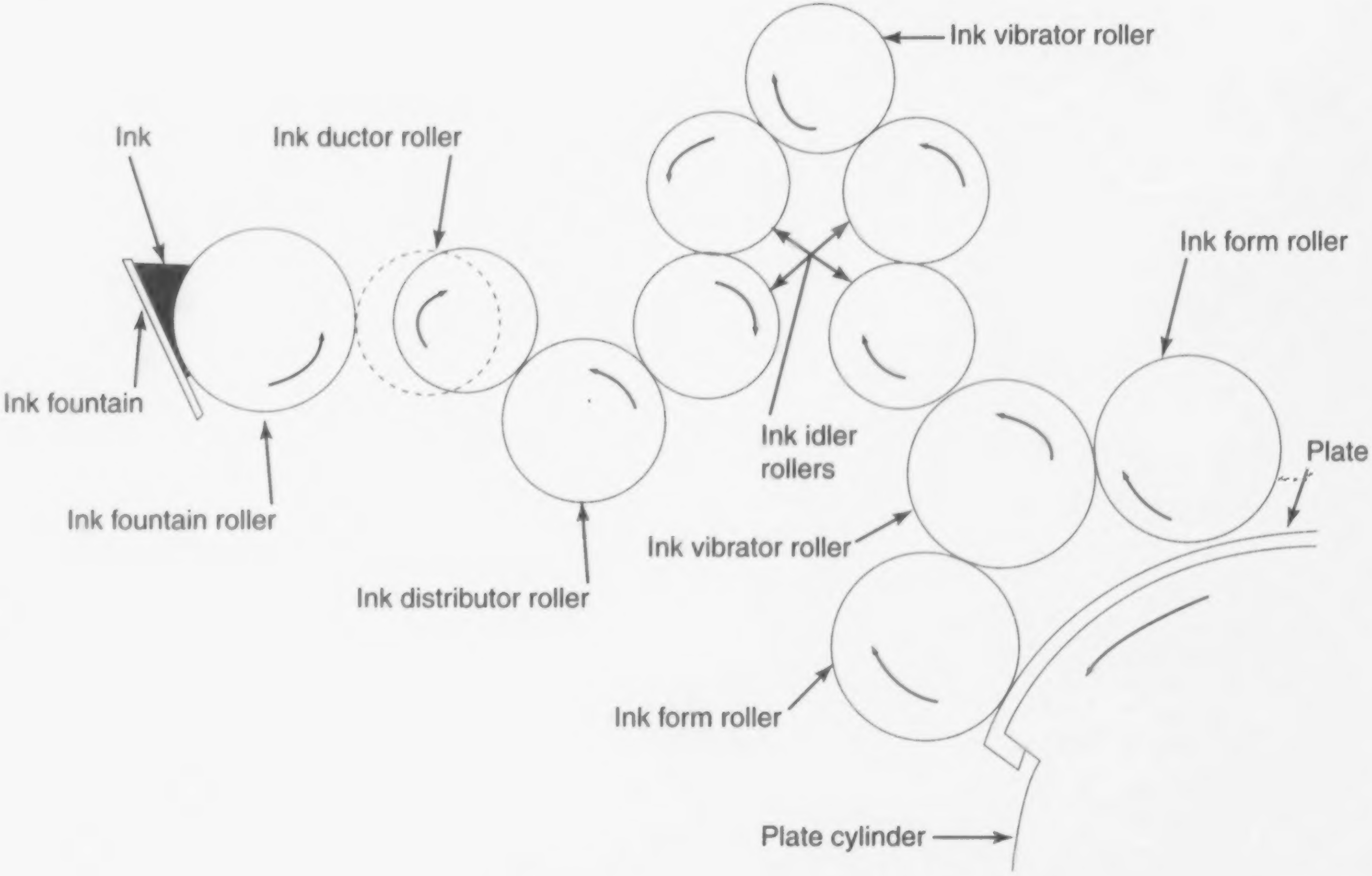
Plate cylinder
Blanket cylinder
Blanket cylinder
Plate cylinder
Plate cylinder
Blanket cylinder
Blanket cylinder
Common impression cylinder
Delivery cylinder
Dampening system
Inking system
Plate cylinder
Inking system
Blanket cylinder
Dampening system
Impression cylinder
Paper

Perfector (Blanket to Blanket)

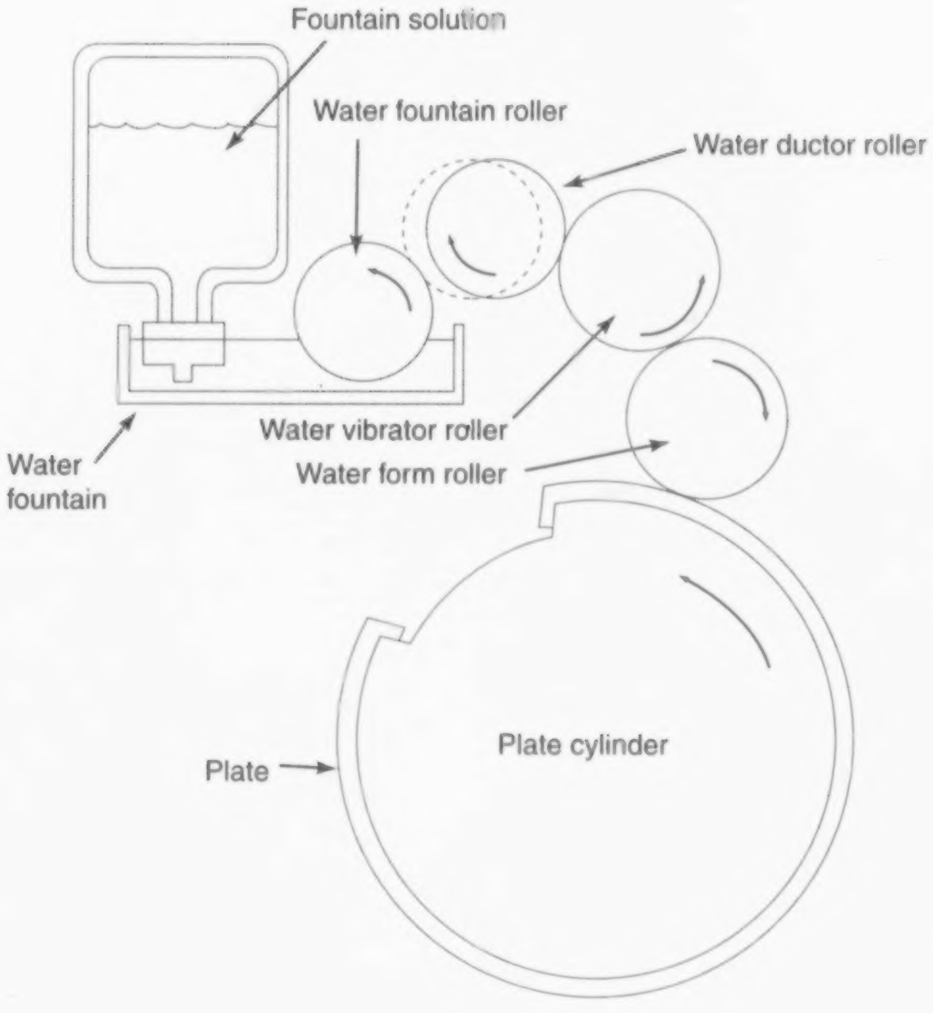
Two-Color Common Impression Cylinder

Two-Color Common Blanket Cylinder

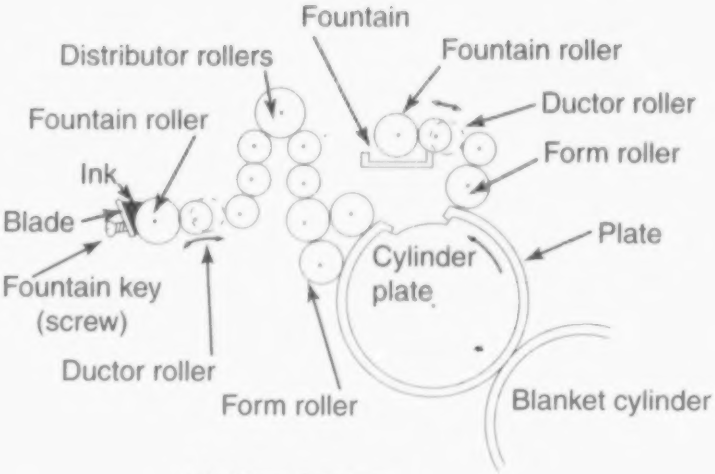
Components of the Inking System


Ink vibrator roller
Ink
Ink ductor roller
Ink form roller
Ink fountain
Ink idler rollers
Plate
Ink fountain roller
Ink vibrator roller
Ink distributor roller
Ink form roller
Plate cylinder

Components of the Dampening System

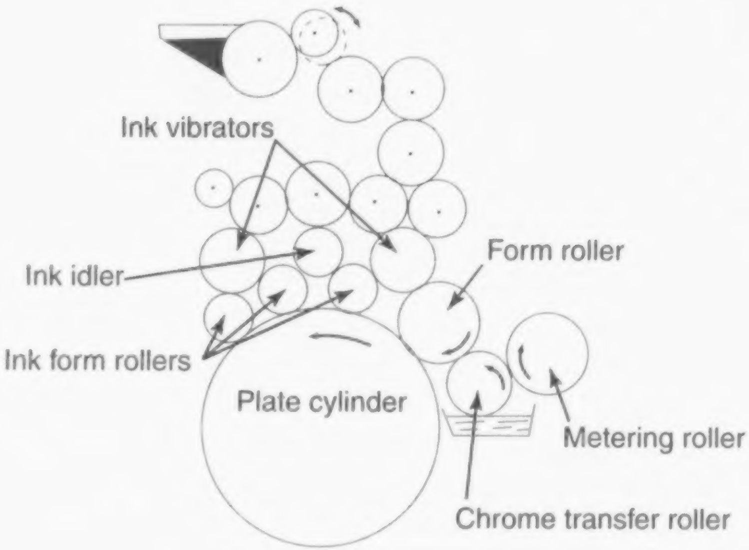

Fountain solution
Water fountain roller
Water ductor roller
Water vibrator roller
Water form roller
Water fountain
Plate
Plate cylinder

Types of Dampening Systems


Fountain
Distributor rollers
Fountain roller
Fountain roller
Ductor roller
Ink
Form roller
Blade
Plate
Cylinder plate
Fountain key (screw)
Ductor roller
Form roller
Blanket cylinder

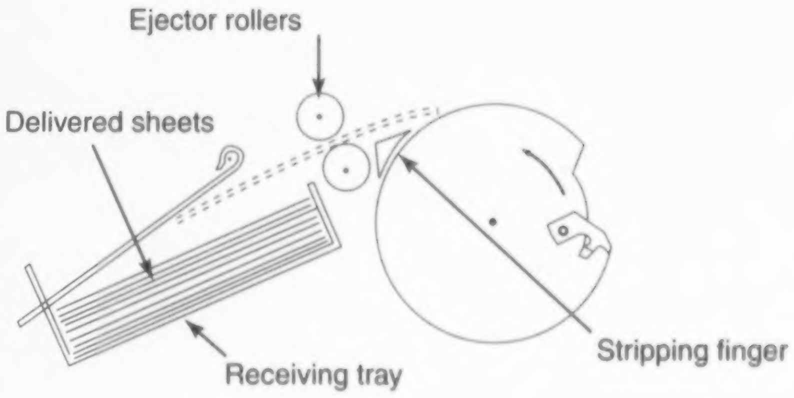
2 Inking System

Conventional Inking and Dampening System

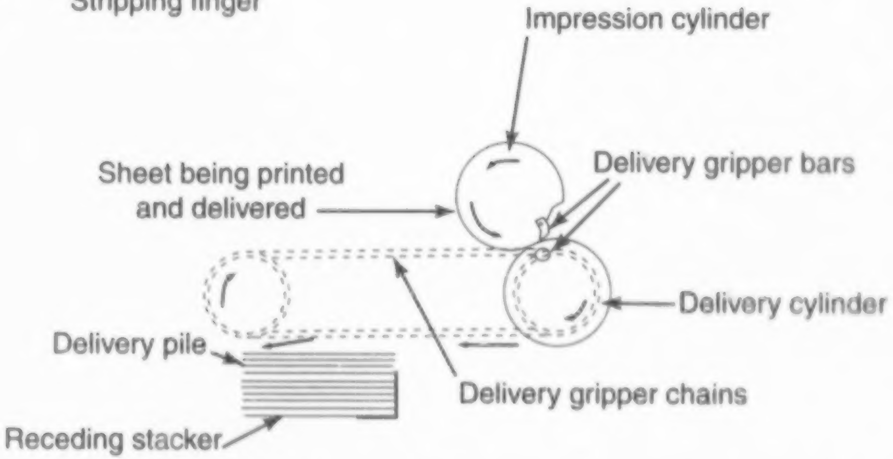

Ink vibrators
Form roller
Ink idler
Ink form rollers
Plate cylinder
Metering roller
Chrome transfer roller

Integrated System

Components of the Delivery System


Ejector rollers
Delivered sheets
Stripping finger
Receiving tray

Tray Delivery


Impression cylinder
Delivery gripper bars
Sheet being printed and delivered
Delivery cylinder
Delivery pile
Delivery gripper chains
Receding stacker

Chain Delivery With Receding Stacker

Offset Inks and Dampening Chemistry

Unit Contents

Teacher Page

Teacher Components

Suggested Activities 2–3
Answers to Assignment Sheets 2–9
Written Test 2–11
Answers to Written Test 2–17
Learning Activities Sheet 2–19

Transparency Master

1—Methods of Ink Drying 2–21

Student Page

Student Components

Objective Sheet 2–3
Information Sheet 2–5

Assignment Sheets

1—Conduct an Ink Cabinet Inventory 2–17
2—Conduct an Inventory of Offset Press Dampening Chemistry 2–19

Job Sheets

1—Mix Dampening Solution and Test for pH 2–21
2—Mix PMS Colors; Conduct and Evaluate an Ink Draw-Down or Smear 2–23
3—Mix Two Colors of Ink to Produce a Third Color 2–25

Suggested Activities

Instructional Plan

Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resources" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.
- Make a transparency from the transparency master included in this unit. This appears in the teacher edition only.

Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss the assignment sheets. Review with students the criteria for evaluation of these activities.

Suggested Activities

- Discuss and demonstrate the job sheets. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of these activities and the rating scale that will be used to indicate job performance.

Teaching Suggestions

- Discuss the Pantone Matching System and provide students with a color formula guide.

  Note: If mixing colors of inks is to be included in the curriculum, it is recommended that a PMS mixing kit be acquired from an ink manufacturer and that manufacturer's instructions be followed.

- Demonstrate effects of coated and uncoated papers with a given ink.

- Invite press and ink manufacturers' representatives to demonstrate their products.

- Discuss the various methods of disposing of ink with students.

Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.

- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.

- Evaluate the assignment sheets. Rate the student using the criteria listed on each assignment sheet. See Answers to Assignment Sheets for correct answers where applicable. If the student's performance is unacceptable, have the student review the appropriate materials and complete the assignment again.

- Evaluate the job sheets. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

Sample A

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

Sample B

Yes—Can perform job with no additional training.
No—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

Resources Used In Developing This Unit

Print Media

- Anton, Karl V., Jr. *Handbook of Technical Articles*. Mineola, NY: Van Son Holland Ink Corp. of America.
- Cogoli, John E. *Photo-Offset Fundamentals*. Old Tappan, NJ: Macmillan Publishing Co., Inc., 1986.
- Dennis, Ervin A., and John D. Jenkins. *Comprehensive Graphic Arts*. Old Tappan, NJ: Macmillan Publishing Co., Inc., 1983.
- Destree, Thomas M. *The Lithographers Manual*. 9th ed. Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.
- Lankford, William. *The Offset Press Dampening System*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1980.
- *Press Operator's Guide*. St. Paul, MN: 3M Company, 1989.
- Spence, William D., and David G. Vequist. *Graphic Reproduction*. Westerville, OH: Glencoe McGraw-Hill, 1980.

Suggested Activities

Electronic Media

- National Soy Ink Information Center. www.soyink.com.
- Waterless Printing Association. www.waterless.org.

Suggested Supplemental Resources

Print Media

- Eldred, Nelson R., and Terry Scarlett. *What the Printer Should Know About Ink*. 2d ed. Pittsburgh, PA: Graphic Arts Technical Foundation, 1995.
- O'Rourke, John. *The Complete Guide to Waterless Printing: A Reference and User's Manual*. Quantum Resources, Inc., 1997.

  The two books listed above are available from:

  Graphic Arts Technical Foundation
  200 Deer Run Road
  Sewickley, PA 15143-2600
  Fax: 412-741-2311
  Phone: 1-800-662-3916
  www.gatf.org

- *A Guide to Pressroom Chemistry*. Orange Park, FL: International Paper Imaging Products Division, 1993.

  Available from:

  ANCHŐR
  50 Industrial Loop North
  Orange Park, FL 32073 USA
  Toll-free: 1-800-354-2300
  Phone: 904-264-3500
  www.anchorlith.com

- To order free pictures/poster or "America's Printing Plant" brochure and/or a set of nine fact sheets about soy ink, contact:

  National Soy Ink Information Center
  4554 N.W. 114th Street
  Urbandale, IA 50322-5410
  Phone: 1-800-747-4275
  www.soyink.com

- For more information about waterless printing, contact:

  Waterless Printing Association
  P.O. Box 59800
  Chicago, IL 60659
  Phone: 773-743-5677
  www.waterless.org

Electronic Media

- Videotapes
  - — *Introduction to Lithographic Ink.* No. 4540
  - — *Lithographic Ink Properties and Testing.* No. 4541
  - — *Ink Measurement and Process Control.* No. 4542

  The three videotapes listed above are also available on one CD-ROM, *Ink in Color Reproduction.* No. 4650.

  - — *Dampening Chemistry.* No. 4223

  The videotapes and CD-ROM listed above are available from:

  Graphic Arts Technical Foundation
  200 Deer Run Road
  Sewickley, PA 15143-2600
  Fax: 412-741-2311
  Phone: 1-800-662-3916
  www.gatf.org

- Graphic COMM Central
  http://teched.vt.edu/gcc/
  This site contains a wide range of educational information about graphic arts. For more information about ink, download the Printer's Digest PDF file.

Answers to Assignment Sheets

Assignment Sheet 1

Conduct an Ink Cabinet Inventory

The student should submit a complete list of all inks and additives in the storage area of the school shop. The list should contain brand names by color and additives with their uses.

Assignment Sheet 2

Conduct an Inventory of Offset Press Dampening Chemistry

The student should submit a complete list of chemicals used to prepare fountain solution for all presses in the shop, including chemical, type of plate, purpose, and mixing ratios.

Written Test

Name ____

Date ______________________________ Score__________

Objective 1

Match the terms with their definitions. Definitions continue on the next page.

1. Draw-down
2. Drier
3. Extender
4. Fugitive
5. Lakes
6. Length
7. Metallic inks
8. Opacity
9. Permanence
10. pH
11. Pigments
12. PMS (Pantone Matching System)
13. Relative humidity
14. Resin
15. Resistant
16. Tack
17. Toners
18. Translucence
19. Transparency
20. Varnish
21. Vehicle
22. Viscosity

_____ a. The resistance of ink to flow

_____ b. The stickiness of the ink

_____ c. The ability of ink to flow and form long or short filaments

_____ d. The hiding or covering quality of ink

_____ e. The characteristic of an ink that allows images beneath it to show through

_____ f. A property of nonfading regardless of exposure to strong light or passage of time

_____ g. A tendency to lose color or fade when exposed to sunlight for long periods

_____ h. Manufactured to withstand the action of such factors as gases, chemicals, heat, and moisture

_____ i. Ink body colors which are not particularly strong

_____ j. Strong ink body colors with highly concentrated pigments

_____ k. Inks containing finely ground metallic powder, such as aluminum and bronze, which are used to provide silver and gold colors

_____ l. Natural organic substance from plants which is not soluble in water

_____ m. A symbol for the strength of acid or alkali in any solution, represented on a scale from 0–14 with 7 as neutral, 0 as acid, and 14 as alkaline

_____ n. The amount of water vapor in the air compared to the greatest amount possible at the same temperature

_____ o. A colorless substance mixed with ink to increase its covering power

_____ p. Any substance added to ink to speed drying

_____ q. A thin, protective coating which is printed like ink on the paper stock; also used as an additive to vary ink properties

_____ r. The varying quality of an ink between opacity and transparency

_____ s. A standardized, nearly universally accepted matching system for mixing inks to produce given colors

_____ t. The coloring materials in ink

_____ u. The bulk of the body of an ink

_____ v. A test procedure for comparing two or more inks for color strength, opacity, and general appearance

Objective 2

Select true statements concerning the main ingredients of offset inks by placing an "X" in the appropriate blanks.

_____ a. Synthetic oils are types of vehicles which form the body bulk of the ink.

_____ b. White pigments are primarily carbon produced by burning petroleum products.

_____ c. Colored pigments are mostly synthetic; produced by processing chemicals to make dyes.

_____ d. Thin oils and solvents reduce tack.

_____ e. Some types of modifiers are driers, waxes, and gums.

Objective 3

Name three ink manufacturing procedures which benefit the user.

a. ______________________________

b. ______________________________

c. ______________________________

Written Test

Objective 4

Match types of ink with their descriptions by placing the numbers in the appropriate blanks.

1. Aqueous coating
2. Gloss inks
3. Heat-set inks
4. Magnetic inks
5. Metallic inks
6. News inks
7. Process inks
8. Quick-set inks
9. Rubber-base inks
10. Soy inks
11. UV coatable inks
12. Varnish

_____ a. Used on high speed presses with heating devices

_____ b. Dry by penetration and oxidation

_____ c. Exhibit minimum penetration into paper surface

_____ d. Dry by absorption on high speed presses

_____ e. Contain metal powders suspended in a vehicle

_____ f. Contain iron-bearing pigments that can be magnetized

_____ g. Have special colors, transparency, and drying characteristics

_____ h. Dry quickly on most stock, but dry slowly on ink rollers

____ i. Do not contain wax

____ j. Environmentally friendlier than other inks because it contains low amounts of VOCs

____ k. Protective coating applied over the printing

____ l. Water-based product that is applied with a special coating unit

Objective 5

List three conditions influencing the printing performance of offset inks.

a. ______________________________

b. ______________________________

c. ______________________________

Objective 6

Name three ink properties which affect the printing quality of offset inks.

a. ______________________________

b. ______________________________

c. ______________________________

Written Test

Objective 7

Select rules for ink care, storage, and disposal by placing an "X" in the appropriate blanks.

_____ a. Keep covers on all containers when not in use.

_____ b. Reuse ink after it has been removed from the ink fountain.

_____ c. Store inks in open metal cabinet in very cool room.

_____ d. Keep ink surface level when removing ink from can.

_____ e. Recycle ink by mixing black ink with unused color inks.

Objective 8

State the purpose of offset dampening solutions. ______________________

____

Objective 9

Match the dampening solution ingredients with their functions.

1. Acid
2. Buffers
3. Chemical salts
4. Gum
5. Premixed solutions
6. Water

_____ a. The main ingredient which provides the moisture to keep the nonimage areas clean

_____ b. The main desensitizing agent in the fountain solution; absorbed to the nonimage areas where it replaces the water-holding desensitized film worn off the plate during the press run

_____ c. Improves the adherence of the gum to the nonimage area of the plate

_____ d. Keeps the acid in the fountain solution from reacting chemically with the metal of the plate and prevents stripping of the metal ink rollers

_____ e. Stabilizes the pH of a fountain solution

_____ f. Fountain solution chemicals premixed and packaged by manufacturers for specific presses and printing projects

Objective 10

Name the two methods of measuring pH.

a. ____

b. ____

Objective 11

State the generally acceptable pH range for a fountain solution.

____

____

Objective 12

Select effects of using alcohol or alcohol substitutes in a fountain solution by placing an "X" in the appropriate blanks.

_____ a. Increases droplet formation in ink

_____ b. Less dimensional change in sheet

_____ c. Ink drying usually faster

_____ d. Balanced ink-water running condition achieved more slowly

_____ e. More solution on plate

Objective 13

Discuss the importance of ink-water balance by listing three points related to the topic.

a. ____

b. ____

c. ____

Objective 14

Select true statements concerning the characteristics of waterless printing by placing an "X" in the appropriate blanks.

_____ a.. Eliminates the water or dampening system used in conventional printing

____ b. Process of printing is changed from a mechanical process to a chemical process

____ c. Requires a special silicone rubber coated printing plate, special ink, and a means of temperature control on press

***Permission to duplicate this test is granted.**

Answers to Written Test

Objective 1

a. 22
b. 16
c. 6
d. 8
e. 19
f. 9
g. 4
h. 15
i. 5
j. 17
k. 7
l. 14
m. 10
n. 13
o. 3
p. 2
q. 20
r. 18
s. 12
t. 11
u. 21
v. 1

Objective 2

a, c, d, e

Objective 3

a. Ink is mixed in batches and carefully weighed.
b. Ink is tested at the factory under actual printing conditions.
c. Packaging varies for convenient use and storage.

Objective 4

a. 3
b. 8
c. 2
d. 6
e. 5
f. 4
g. 7
h. 9
i. 11
j. 10
k. 12
l. 1

Objective 5

a. Type of press being used
b. Speed of press
c. Stock surface being printed

Objective 6

a. Color
b. Body
c. Ability to dry

Objective 7

a, d, e

Objective 8

The purpose of offset dampening solutions—To keep the nonimage area of a well-processed offset plate clean

Objective 9

a. 6
b. 4
c. 1
d. 3
e. 2
f. 5

Objective 10

a. pH paper test strips
b. Electronic pH meter

Objective 11

Depends on the ink and paper being used; generally a solution with a pH between 4.0 and 5.0 is satisfactory

Objective 12

b, c

Answers to Written Test

Objective 13

Any three of the following:

a. Key to quality printing
b. The basic rule for proper adjustment of ink-water balance is to run the minimum amount of ink which will give full color to the job and the minimum amount of water to keep the plate clean
c. Should be controlled to meet the needs of the plate
d. Proper control demands accurate analysis of problems as they occur
e. Excessive water causes problems
f. Insufficient water causes problems

Objective 14

a, c

Prerequisites:
None

Learning Activities Sheet

Student Name ____________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 4.

☐ 4. **Research** Online resources regarding different types of ink. Visit www.theinkcompany.com and www.soyink.com as two of your sources.

☐ 5. **Do** Assignment Sheet 1, "Conduct an Ink Cabinet Inventory."

☐ 6. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 7. If the evaluation is not satisfactory, repeat steps 3 and 5.

☐ 7. **Study** Information Sheet, Objectives 5 through 9.

☐ 8. **Do** Assignment Sheet 2, "Conduct an Inventory of Offset Press Dampening Chemistry."

☐ 9. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 10. If the evaluation is not satisfactory, repeat steps 7 and 8.

☐ 10. **Study** Information Sheet, Objectives 10 through 12.

☐ 11. **Observe** Demonstration of procedures to be used in completing Job Sheet 1.

☐ 12. **Do** Job Sheet 1, "Mix Dampening Solution and Test for pH."

Learning Activities Sheet

☐ 13. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 14. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat steps 10 through 12.

☐ 14. **Study** Information Sheet, Objectives 13 and 14.

☐ 15. **Observe** Demonstration of procedures to be used in completing Job Sheets 2 and 3.

☐ 16. **Do** **Job Sheet 2**, "Mix PMS Colors; Conduct and Evaluate an Ink Draw-Down or Smear" and **Job Sheet 3**, "Mix Two Colors of Ink to Produce a Third Color."

☐ 17. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 2 and 3, continue to step 18.

☐ 18. **Check** With instructor for any additional assignments to be completed.

☐ 19. **Do** Additional assignments listed below.

____

____

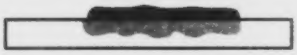
____

☐ 20. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

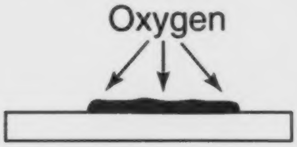
☐ 21. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

*Permission to duplicate this form is granted.

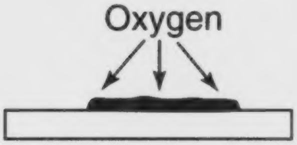
Methods of Ink Drying



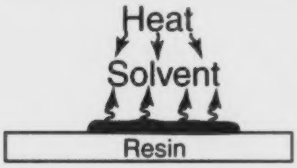
Absorption Nondrying oils penetrate the paper and dry as they are absorbed.



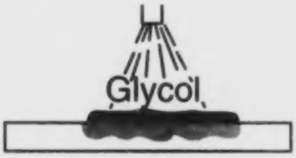
Oxidation The vehicle absorbs oxygen from the air and becomes solid.



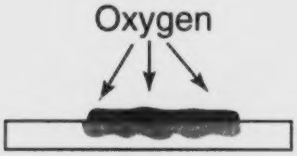
Polymerization Oxygen sets up a reaction that causes molecules to form a gel, then large molecular chains that harden.



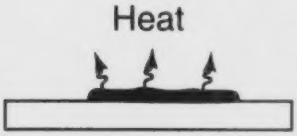
Resin-solvent The combination resin-solvent vehicle releases the solvent causing the resin to dry; process can be speeded by heating.



Moisture-set A glycol-resin vehicle is sprayed with water or steam; glycol mixes with water and is absorbed by the paper and the resin precipitates as a solid film.



Resin-oil A combination of absorption and oxidation provides quick setting.



Coldset A wax and resin vehicle is heated, then becomes solid as heat is radiated away from the vehicle as it cools.

Unit Contents

Teacher Components

Teacher Page

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Answers to Written Test 3–15

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Transparency Master

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Student Page

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Student Supplements

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1—Compare Control Features of Offset and Digital Presses 3–15

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1—Set Up the Sheet Control Systems 3–31
2—Set Up the Image Control Systems 3–37
3—Operate an Offset Press From Setup of Systems Through Printed Sheet Delivery 3–41
4—Rule Up a Sheet 3–47
5—Perform a Color Wash on an Offset Press 3–49
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Unit Contents

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13—Print Solids 3–97
14—Print Using Photodirect and/or Electrostatic Masters 3–103
15—Print a Four-Color Process Job 3–107
16—Perform Perforation and Scoring 3–113

Suggested Activities

Instructional Plan

Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resources" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.
- Make a transparency from the transparency master included in this unit. This appears in the teacher edition only.

Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss the assignment sheet. Review with students the criteria for evaluation of this activity.

Suggested Activities

- Discuss and demonstrate the job sheets. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of these activities and the rating scale that will be used to indicate job performance.

Teaching Suggestions

- Invite a representative from a printing firm or press manufacturing company to discuss features of various presses.
- Obtain manuals for several different presses and compare operating controls with the class.
- Take students to visit print shops that have presses with advanced features and digital presses.
- Discuss with students the advantages of digital presses.
- Prepare a printed press sheet and job ticket for use with Job Sheet 4, "Rule Up a Sheet."

Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.
- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.
- Evaluate the assignment sheet. Rate the student using the criteria listed on each assignment sheet. See Answers to Assignment Sheet for correct answers where applicable. If the student's performance is unacceptable, have the student review the appropriate materials and complete the assignment again.
- Evaluate the job sheets. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

  Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

Sample A

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

Sample B

Yes—Can perform job with no additional training.
No—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

Resources Used in Developing This Unit

Print Media

- *ATF Chief 15-17 Operator's Manual.* Whittensville, MA: American Type Founders.
- Lem, Dean Phillip. *Graphics Master 6.* 6th ed. Kihei, HI: Dean Lem Associates, Inc., 1997.
- *Models 350 and 360 Offset Duplicators Operating Instructions.* Rochester, NY: Itek Grafix Corp., 1987.
- *Operation Manual.* Heidelberg Offset, Heidelberg, West Germany: Heidelberger Druckmaschinen Aktiengesellschaft.
- *Operation Manual 3985.* Rochester, NY: Itek Grafix Corp., 1987.
- *Operation Manual 975/CPD.* Rochester, NY: Itek Grafix, Corp., 1987.
- *Pocket Pal: A Graphic Arts Production Handbook.* Memphis, TN: International Paper Company, 1997.
- *1250 Offset Operator Manual.* Mt. Prospect, IL: AM International, Inc.
- *1650 Series Operator Manual.* Mt. Prospect, IL: AM International, Inc.

Suggested Activities

Electronic Media

- www.heidelbergusa.com

Suggested Supplemental Resources

Print Media

- Fenton, Howard M., and Frank J. Romano. *On-Demand Printing: The Revolution in Digital and Customized Printing*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1997.—This edition summarizes the concepts, technologies, and applications of on-demand printing, and includes profiles of specific on-demand devices. No. 1341
- DeJidas, Lloyd P., and Thomas M. Destree. *Sheetfed Offset Press Operating*. 2d ed. Pittsburgh, PA: Graphic Arts Technical Foundation, 1995.—Combines theoretical and practical how-to information. No. 1530
- Learning Modules
  - *Sheet Control on the Offset Press*. No. 0621
  - *Plate Mounting on the Offset Press*. No. 0631
  - *Blanket Mounting on the Offset Press*. No. 0641
  - *Operating the Inking System*. No. 0651
  - *Operating the Dampening System*. No. 0661
  - *Aligning/Adjusting Cylinders*. No. 0671
  - *Offset Press Makeready*. No. 0681

Electronic Media

- Videotapes
  - *The Offset Printing Unit*. No. 5051
  - *Cylinder Adjustments and Alignments*. No. 5052
  - *Offset Press Cylinder Packing*. No. 5054
  - *Cylinder Packing: Changing Image Length*. No. 5055

All of the resources listed above are available from:

Graphic Arts Technical Foundation
200 Deer Run Road
Sewickley, PA 15143-2600
Fax: 412-741-2311
Phone: 1-800-662-3916
www.gatf.org

Answers to Assignment Sheet

Assignment Sheet 1

Compare Control Features of Offset and Digital Presses

The student should compare control features on various presses, either in the shop or illustrated, and submit a list of control features common to all presses they compared, as well as a list of unique control features found on each of the presses.

Written Test

Name ____

Date ______________________________ Score __________

Objective 1

Match the terms with their definitions. Definitions continue on the next page.

1. Blanket wash
2. Color bar
3. Dot gain
4. Etch
5. Feed table extensions
6. Handwheel
7. Makeready
8. Night latch
9. Paper bail
10. Picking
11. Rule-up
12. Setoff
13. Sheetwise

_____ a. A wheel on the operator's side of a press which allows the operator to turn the press through its cycle by hand

_____ b. A petroleum base solvent prepared for washing rubber offset blankets and rollers; used for general press clean up

_____ c. A thin, narrow, long metal strip attached to the delivery system which aids in controlling the delivery of a sheet to the receiving tray

_____ d. Process that press operator goes through in setting up the press for a press run

_____ e. Indicates how much the dots of ink have spread in the paper in relation to the original dot size on the film

_____ f. To print one side of the paper with one plate, then turn the sheet over and print the other side with another plate using the same gripper and side guide

_____ g. A solution that conditions the nonimage area of an offset plate to make it more water receptive

_____ h. A position of slight separation of the rollers in the ink and dampening systems used when the press is not operated for a period of time to prevent flat stripes from forming on roller surfaces

_____ i. Movable metal plates which attach at right angles to the feed table surface to extend its height and allow open space to accommodate the side and back paper guides when the feed table is at top position

_____ j. A condition caused by wet ink from the image transferring to the impression cylinder when printing a two-sided job

_____ k. Process that press operator goes through if the job ticket indicates that sheets are going to be cut, folded, or bound. The operator will use a square table and a T-square to visibly see that the size and bleed amounts coincide with the job finishing instructions.

_____ l. A condition caused by wet ink from the image on the surface of one sheet rubbing off onto the next sheet in contact with the image

_____ m. A series of ink patches printed on a press sheet that include solid patches of the ink and 25%, 50%, and 75% screen tints of those colors.

Objective 2

Select true statements concerning essential safety precautions by placing an "X" in the appropriate blanks.

_____ a. Tie back long hair.

_____ b. Avoid or bind up loose clothing.

_____ c. Remove jewelry such as bracelets, watches, rings, and necklaces before operating a press.

_____ d. Keep dust cover and safety guards in place for operation.

_____ e. Stop the press when using tools for adjustments, making hand adjustments on moving parts, wiping or cleaning with a rag, lubricating any part, clearing paper jams, or leaving press area.

_____ f. Limit use of press to one designated operator at any one time.

_____ g. Receive specific permission or assignment before press is operated.

_____ h. Wad rags for cleaning rather than folding in hand.

_____ i. Place dirty rags in a cardboard trash box.

_____ j. Read operator's manual while press is running.

_____ k. Keep press work area free of trash and clutter.

_____ l. Inspect and turn press with the handwheel at least one revolution before starting drive motor.

_____ m. Make sure electrical connections are in full contact and free of frayed or broken insulation.

_____ n. Ventilate fumes from the press area.

_____ o. Store flammable liquids wherever there is room for them.

_____ p. If any parts or guards are broken or missing, continue working on the press and inform the instructor later.

Objective 3

List two reasons why efficient press operation is important.

a. ______________________________

____

b. ______________________________

____

Objective 4

Select offset press operator control functions by placing an "X" in the appropriate blanks.

_____ a. Control ink to plate image area

_____ b. Control dampening solution to plate image area

_____ c. Complete job order records for press operation

_____ d. Control press wash-up

_____ e. Maintain safe and orderly work area

Objective 5

Match typical operator control features with the press systems in which they are located.

Note: Answers will be used more than once.

1. Cylinder system
2. Dampening system
3. Delivery system
4. Feeder system
5. Inking system
6. Register system

_____ a. Feed roller timing

_____ b. Paper delivery guides

_____ c. Double sheet detector

____ d. Vertical image position

____ e. Ink form roller on/off control

____ f. Water form roller on/off control

____ g. Feed table raise/lower crank

____ h. Sheet control wheels

____ i. Ejector unit for tray and receding stacker

____ j. Handwheel

____ k. Fountain solution

____ l. Ink fountain adjusting screws

____ m. Water feed control lever

____ n. Paper turning wheels for chain delivery

____ o. Paper feed guides

____ p. Sheet hold down strips

____ q. Stack height regulator

____ r. Plate position

____ s. Pull-out roller pressure

____ t. Side register guides

____ u. Stacker raise/lower crank

____ v. Vacuum control

____ w. Ink feed lever

____ x. Blanket to impression cylinder pressure

____ y. Paper stops

____ z. Sheet separators

____ aa. Stacker lowering speed control

____ bb. Feed roller pressure

____ cc. Plate to blanket pressure

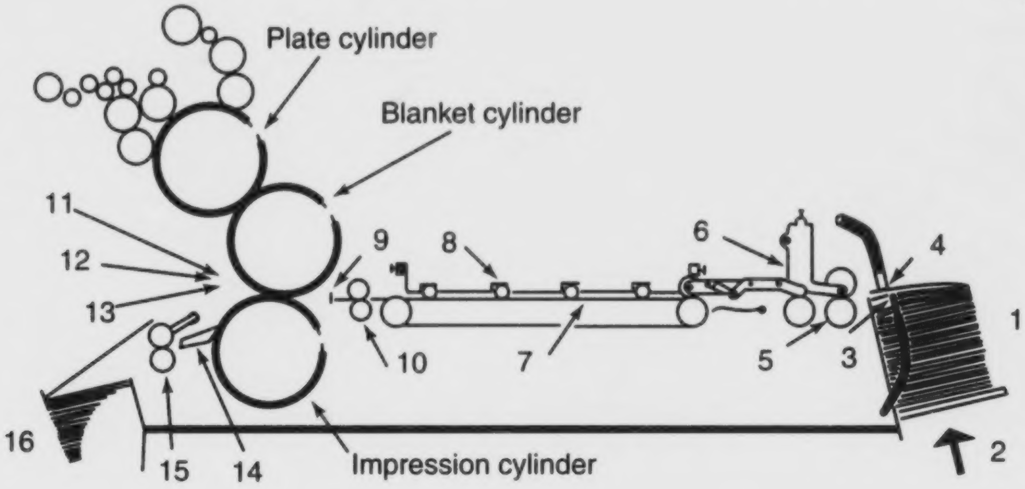
____ dd. Air blast (blower) control

____ ee. Water ductor roller on/off control

____ ff. Ink ductor roller on/off control

Objective 6

Arrange in order the steps in the sequence of paper movement through a typical offset press by writing a "1" for the first step, a "2" for the second step, and so on, using the diagram as a guide.



_____ a. Pullout rollers move sheet to register board.

_____ b. Cylinder grippers grip sheet and guide it between impression and blanket cylinders.

_____ c. Receiving tray or table holds finished sheets.

_____ d. Paper is placed on feed table.

_____ e. Several moving tapes carry paper along register board.

_____ f. Strippers separate the paper from the impression cylinder.

_____ g. Stop fingers move up and down to halt sheet for register to side position and for timing of feed into cylinder grippers.

_____ h. Sucker tube lifts paper, moving it to pullout rollers.

_____ i. After holding the sheet for less than one revolution, the cylinder grippers open.

_____ j. Feed table raises automatically.

_____ k. Image transfers to paper from blanket by pressure from the impression cylinder.

_____ l. Ejector wheels guide the paper into receiving tray or stacker.

____ m. Sheet separators and air blowers separate sheets.

____ n. Balls and metal strips hold paper down on tapes.

____ o. Feed rollers move sheet into cylinder grippers.

____ p. Double sheet detector prevents more than one sheet from going to register system at a time.

***Permission to duplicate this test is granted.**

Answers to Written Test

Objective 1

a.	6	e.	3	i.	5	m.	2
b.	1	f.	13	j.	10		
c.	9	g.	4	k.	11		
d.	7	h.	8	l.	12		

Objective 2

a, b, c, d, e, f, g, k, l, m, n

Objective 3

a. No income is received unless printed sheets are delivered from the press.

b. Reduced profit potential results from inefficient use of time, equipment, and materials.

Objective 4

a, c, d, e

Objective 5

a.	6	i.	3	q.	4	y.	6
b.	3	j.	1	r.	1	z.	4
c.	4	k.	2	s.	4	aa.	3
d.	1	l.	5	t.	6	bb.	6
e.	5	m.	2	u.	3	cc.	1
f.	2	n.	3	v.	4	dd.	4
g.	4	o.	4	w.	5	ee.	2
h.	6	p.	6	x.	1	ff.	5

Objective 6

a.	5	e.	7	i.	13	m.	3
b.	11	f.	14	j.	2	n.	8
c.	16	g.	9	k.	12	o.	10
d.	1	h.	4	l.	15	p.	6

Unit 3 Offset Press Operating Procedures

Prerequisites:
None

Learning Activities Sheet

Student Name ______________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 5.

☐ 4. **Do** Assignment Sheet 1, "Compare Control Features of Offset and Digital Presses."

☐ 5. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 6. If the evaluation is not satisfactory, repeat steps 3 and 4.

☐ 6. **Study** Information Sheet, Objective 6, and Student Supplements 1 and 2.

☐ 7. **Research** Online resources regarding digital printing. Visit www.chromapress.com as one of your sources.

☐ 8. **Observe** Demonstration of procedures to be used in completing Job Sheet 1.

☐ 9. **Do** Job Sheet 1, "Set Up the Sheet Control Systems."

☐ 10. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 11. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat steps 8 and 9.

☐ 11. **Observe** Demonstration of procedures to be used in completing Job Sheet 2.

☐ 12. **Do** Job Sheet 2, "Set Up the Image Control Systems."

Learning Activities Sheet

☐ 13. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 14. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 2 and repeat steps 11 and 12.

☐ 14. **Observe** Demonstration of procedures to be used in completing Job Sheet 3.

☐ 15. **Do** Job Sheet 3, "Operate an Offset Press From Setup of Systems Through Printed Sheet Delivery."

☐ 16. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 17. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 3 and repeat steps 14 and 15.

☐ 17. **Observe** Demonstration of procedures to be used in completing Job Sheet 4.

☐ 18. **Do** Job Sheet 4, "Rule Up a Sheet."

☐ 19. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 20. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 4 and repeat steps 17 and 18.

☐ 20. **Observe** Demonstration of procedures to be used in completing Job Sheet 5.

☐ 21. **Do** Job Sheet 5, "Perform a Color Wash on an Offset Press."

☐ 22. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 23. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 5 and repeat steps 20 and 21.

Optional

☐ 23. **Interview** Two press operators to learn about possible career opportunities.

☐ 24. **Observe** Demonstration of procedures to be used in completing Job Sheets 6 and 7.

☐ 25. **Do** Job Sheet 6, "Print Envelopes," and Job Sheet 7, "Change Press From Envelopes to Letterhead."

☐ 26. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 6 and 7, continue to step 27.

☐ 27. **Observe** Demonstration of procedures to be used in completing Job Sheet 8.

☐ 28. **Do** Job Sheet 8, "Print a Two-Color, Two-Sided Job."

☐ 29. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 30. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 8 and repeat steps 27 and 28.

☐ 30. **Observe** Demonstration of procedures to be used in completing Job Sheet 9.

☐ 31. **Do** Job Sheet 9, "Print a Two-Color Duotone Using an Additional Color Head."

☐ 32. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 33. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 9 and repeat steps 30 and 31.

☐ 33. **Observe** Demonstration of procedures to be used in completing Job Sheets 10 and 11.

☐ 34. **Do** Job Sheet 10, "Print a Work-and-Turn," and Job Sheet 11, "Print a Work-and-Tumble."

☐ 35. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 10 and 11, continue to step 36.

☐ 36. **Observe** Demonstration of procedures to be used in completing Job Sheets 12 and 13.

☐ 37. **Do** Job Sheet 12, "Print Halftones and Screen Tints," and Job Sheet 13, "Print Solids."

☐ 38. **Stop** After completing each job sheet, have your instructor evaluate your performance. If the evaluation is satisfactory, continue to the next job sheet. If the evaluation is not satisfactory, study the procedure outlined in that job sheet, and redo the job sheet. After satisfactorily completing Job Sheets 12 and 13, continue to step 39.

☐ 39. **Observe** Demonstration of procedures to be used in completing Job Sheet 14.

☐ 40. **Do** Job Sheet 14, "Print Using Photodirect and/or Electrostatic Masters."

☐ 41. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 42. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 14 and repeat steps 39 and 40.

☐ 42. **Observe** Demonstration of procedures to be used in completing Job Sheet 15.

☐ 43. **Do** Job Sheet 15, "Print a Four-Color Process Job."

☐ 44. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 45. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 15 and repeat steps 42 and 43.

☐ 45. **Observe** Demonstration of procedures to be used in completing Job Sheet 16.

☐ 46. **Do** Job Sheet 16, "Perform Perforation and Scoring."

☐ 47. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 48. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 16 and repeat steps 45 and 46.

☐ 48. **Check** With instructor for any additional assignments to be completed.

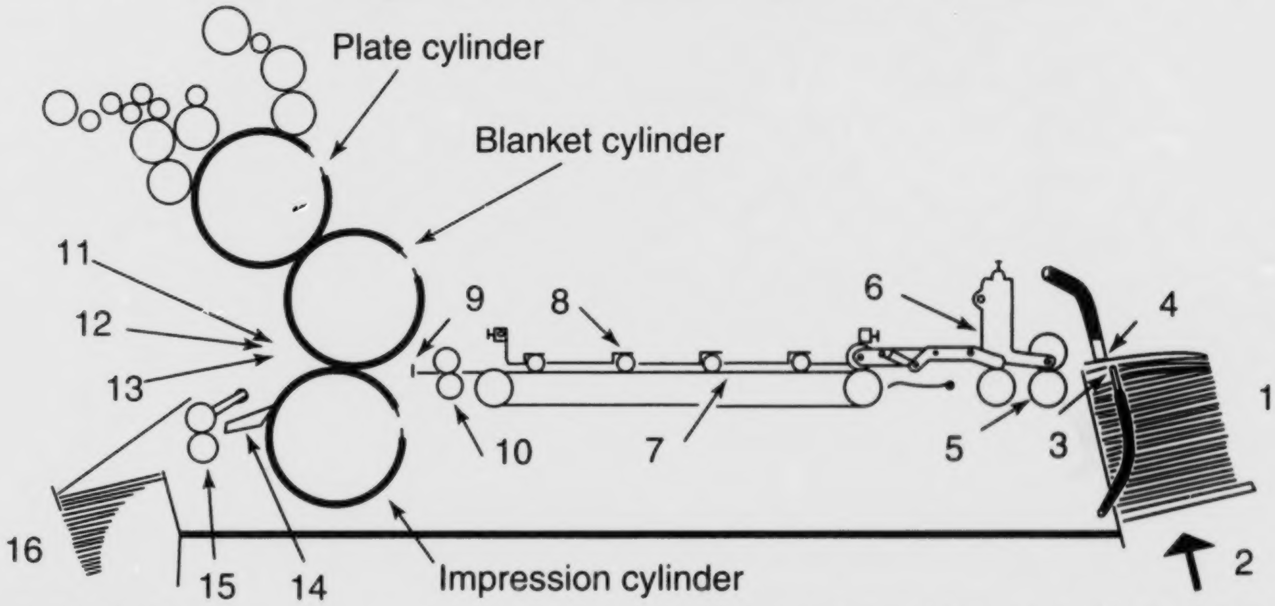
☐ 49. **Do** Additional assignments listed below.

☐ 50. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 51. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

***Permission to duplicate this form is granted.**

Sequence of Paper Movement Through a Typical Offset Press



1. Paper is placed on feed table.
2. Feed table raises automatically.
3. Sheet separators and air blowers separate sheets.
4. Sucker tube lifts paper, moving it to pullout rollers.
5. Pullout rollers move sheet to register board.
6. Double sheet detector prevents more than one sheet from going to register system at a time.
7. Several moving tapes carry paper along register board.
8. Balls and metal straps hold paper down on tapes.
9. Stop fingers move up and down to halt sheet for register to side position and for timing of feed into cylinder grippers.
10. Feed rollers move sheet in to cylinder grippers.
11. Cylinder grippers grip sheet and guide it between impression and blanket cylinders.
12. Image transfers to paper from blanket by pressure from the impression cylinder.
13. After holding the sheet for less than one revolution the cylinder grippers open.
14. Strippers separate the paper from the impression cylinder. (NOTE: On chain delivery systems the paper is transferred from cylinder grippers to chain grippers at this point.)
15. Ejector wheels guide the paper into receiving tray or stacker.
16. Receiving tray or table (jogger) holds finished sheets.

Unit 4

Preventive Maintenance and Troubleshooting

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3—Troubleshooting Guide for Registration Problems 4–25
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1—Use a Troubleshooting Guide to Find the Best Solution to an Ink and Dampening Problem 4–33
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Suggested Activities

Instructional Plan

Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resources" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.
- Make transparencies from the transparency masters included in this unit. These appear in the teacher edition only.

Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss the assignment sheets. Review with students the criteria for evaluation of these activities.

Suggested Activities

- Discuss and demonstrate the job sheets. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of these activities and the rating scale that will be used to indicate job performance.

Teaching Suggestions

- Invite resource people to demonstrate troubleshooting procedures and adjustments on various pieces of equipment.

- Emphasize care in handling any cleaning solvents and chemicals.

- Collect samples of printed materials that illustrate process (image transfer) problems, paper stock problems, registration problems, ink and dampening problems, and/or mechanical problems to show to the class.

Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.

- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.

- Evaluate the assignment sheets. Rate the student using the criteria listed on each assignment sheet. See Answers to Assignment Sheets for correct answers where applicable. If the student's performance is unacceptable, have the student review the appropriate materials and complete the assignment again.

- Evaluate the job sheets. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

  Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

  Two sample performance evaluation keys have been provided on the next page. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

Suggested Activities

Sample A

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

Sample B

Yes—Can perform job with no additional training.
No—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

Resources Used in Developing This Unit

Print Media

- Anton, Karl V., Jr. *Handbook of Technical Articles.* Mineola, NY: Van Son Holland Ink Corporation of America.
- *ATF Chief Operating Instructions.* Whittensville, MA: American Type Founders.
- Cogoli, John E. *Photo Offset Fundamentals.* Old Tappan, NJ: Macmillan Publishing Co., Inc., 1986.
- *Operation Manual.* Heidelberg Offset, Heidelberg, West Germany: Heidelberger Druckmaschinen Aktiengesellschaft.
- *Operation Manual 3985.* Rochester, NY: Itek Grafix Corp., 1987.
- *Operation Manual 975/CPD.* Rochester, NY: Itek Grafix Corp., 1987.
- *Press Operator's Guide.* St. Paul, MN: 3M Company, 1989.
- Spence, William D., and David G. Vequist. *Graphic Reproduction.* Westerville, OH: Glencoe McGraw-Hill, 1980.
- *1250 Offset Operator's Manual*. Mt. Prospect, IL: AM International, Inc., 1989.
- *1650 Series Operator's Manual.* Mt. Prospect, IL: AM International, Inc., 1987.

Suggested Activities

Suggested Supplemental Resources

Print Media

- Rizzo, Ken. *Total Production Maintenance: A Guide for the Printing Industry*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1997. No. 1543
- *Solving Sheetfed Offset Press Problems*. 3rd ed. Pittsburgh, PA: Graphic Arts Technical Foundation, 1994. No. 1501

Electronic Media

- Videotapes
    - *Troubleshooting Dampening Problems*. (Two videos) No. 42221 and No. 42222
    - *Troubleshooting Inking Problems—Systems*. No. 42261
    - *Troubleshooting Inking Problems—Paper/Ink*. No. 42262

The books and videotapes listed above are available from:

Graphic Arts Technical Foundation
200 Deer Run Road
Sewickley, PA 15143-2600
Fax: 412-741-2311
Phone: 1-800-662-3916
http://www.gatf.org

- *Duplicator Press*. Order Number: NIM-119-09-V53

This video details the major duplicator press problems in printing, what causes them, and how to eliminate them.

Available from:

NIMCO
P.O. Box 9
102 Hwy. 81 N.
Calhoun, KY 42327-0009
Sales: 1-800-962-6662
http://www.nimcoinc.com

Answers to Assignment Sheets

Assignment Sheet 1

Use a Troubleshooting Guide to Find the Best Solution to an Ink and Dampening Problem

Note: Suggested answers are based on Student Supplement 1.

1. Scumming

2. Any six of the following problems and solutions:

Possible Problems	**Possible Solutions**
Sensitive plate	Desensitize.
Highly bichromated fountain solution	Check solution and remix if necessary.
Plate exposed to light after fountain solution allowed to dry on it	Desensitize or remake plate.
Excessive printing pressure could indirectly cause scum	Check cylinder pressures, adjust as needed
Paper or ink causing plate sensitivity	Check out paper and ink.
Negative plate improperly desensitized or lightstruck	Desensitize or remake plate.
Positive plate underexposed; water on plate during developing/fixing; improperly desensitized	Remake plate.
Ink form roller setting	Check ink form roller setting to the vibrator roller and to the plate. The vibrator roller should drive the ink form roller and not the plate.
Fountain solution too weak or improperly mixed	Increase strength or remix.
Ink sensitizing plate background beyond image area	Desensitize with plate cleaner-conditioner.
Glazed offset blanket	Clean all gum, spray, paper sizing, etc. from blanket with deglazer and pumice.
Low alcohol content	Bring to correct concentration.

Answers to Assignment Sheets

Assignment Sheet 2

Use a Troubleshooting Guide to Find the Best Solution to a Paper Stock Problem

Note: Suggested answers are based on Student Supplement 2.

1. Paper curling .
2.

Possible Problems	Possible Solutions
Too much water	Run with minimum water.
Paper not properly conditioned	Condition paper to pressroom conditions.
Room humidity not constant	Install proper controls.
Heavy copy at end of form	Reverse plate if possible.
High ink tack	Reduce tack of ink with reducing varnish.
Excess blanket to impression cylinder pressure	Reduce impression setting.

Assignment Sheet 3

Use a Troubleshooting Guide to Find the Best Solution to a Registration Problem

Note: Suggested answers are based on Student Supplement 3.

1. Any one of the following: image moving on sheet; paper moving sideways; sheets feeding crooked.
2. The causes and solutions should match the problem the student identified.

Possible Problems	Possible Causes	Possible Solutions
Image moving on sheet	Front paper guide too tight	Adjust paper guide to fit snug against the front edge of the sheet.
	Control wheel too loose	Adjust control roller. The paper should remain flat without buckling.
	Brush wheels too loose	Tighten wheels.
Paper moving sideways	Front paper guides set too loose	Adjust paper guides to fit snug against the front edge of the sheet.
	Jogger side guide set too loose	Adjust the guide so that sheet will not buckle when the guide is all the way in.
Sheets feeding crooked	Vacuum tubes out of adjustment	Check all tubes making sure that all tubes are set equally.
	Conveyor tapes out of adjustment	Adjust the tapes according to the press manual.

Assignment Sheet 4

Use a Troubleshooting Guide to Find the Best Solution to a Process Problem

Note: Suggested answers are based on Student Supplement 4.

1. Weak spots or open areas in printed image

2.

Possible Problems	Possible Solutions
Plate worn	Redevelop plate. Make new plate.
Plate to blanket cylinder pressure too light	Increase pressure.
Blanket to impression cylinder pressure too light	Increase pressure.
Damaged blanket	Apply blanket fix to swell area. Remove blanket and roll out damaged area. Change blanket.
Paper particle buildup on blanket	Clean blanket with blanket wash and water miscible cleaner.
Irregular stock surface	Increase blanket to impression cylinder pressure. Change stock.

Assignment Sheet 5

Use a Troubleshooting Guide to Find the Best Solution to a Mechanical Problem

Answers will vary depending on the specific mechanical problem that the instructor presents to students. The student should locate the specific problem and offer a written solution.

See Student Supplement 5 for a list of possible problems, causes, and solutions to mechanical problems.

Assignment Sheet 6

Determine Lubrication Requirements for a Specific Press

The student should list all daily, weekly/biweekly, and monthly lubrication points for the specific press being used.

Assignment Sheet 7

Set Up a Preventive Maintenance Schedule in Chart Form

The student's chart should be similar to the example and contain all information gathered in Assignment Sheet 6 or other items of your choice.

Assignment Sheet 8

Take an Inventory of Spare Parts

The student should give the part name and how many there are for the press assigned.

Written Test

Name ____

Date ________________________________ Score __________

Objective 1

Match the terms related to preventive maintenance and troubleshooting with their definitions. Definitions continue on the next page.

1. Blanket packing
2. Blanket powder
3. Chalking
4. Deglazer
5. Degreaser
6. Emulsification
7. Ink glaze
8. Misting
9. Paper glaze
10. Picking
11. Piling
12. Preventive maintenance
13. Pumice powder
14. Scumming
15. Sensitized roller
16. Set-off
17. Tinting
18. Toning
19. Trapping
20. Troubleshooting
21. Water miscible cleaner

_____ a. The performance of routinely inspecting, cleaning, adjusting, lubricating, and making minor repairs which aid in preventing major equipment failure and process troubles

_____ b. Powdered volcanic rock used for cleaning and scouring surfaces which must be free of oil residue

_____ c. A cleaner used to dissolve dried ink, solvent, and gum deposits from the surfaces of press rollers and blanket

_____ d. A cleaner used to remove oil and grease residue from the plate and impression cylinder surfaces

_____ e. A cleaner that mixes with water to remove water soluble particles from press rollers, blanket, and cylinders

_____ f. A thin layer of hardened ink, fountain solution, and blanket wash which forms on press rollers and blanket

_____ g. A thin layer of tiny particles of clay, sizing, lint, and other paper components that forms on the press rollers and blanket

_____ h. A powder used to protect the surface of a rubber offset blanket during storage and to aid in maintaining the blanket's resilience

_____ i. A rubber ink roller that will not hold ink on its surface because of fountain solution, etch, and other chemicals dried in the pores

_____ j. The process of analyzing problems to determine probable causes and applying possible solutions until a problem is solved

Written Test

______ k. A mixing of ink and fountain solution affecting the separation of image and nonimage areas of the offset plate

______ l. Ink transferred from the front surface of one sheet to the back surface of the sheet above in the delivery pile

______ m. Ink on the paper turning dry and powdery

______ n. Ability of an ink to print over a previously applied ink

______ o. Emulsified ink suspended in the fountain solution on the plate surface appearing as a uniform tint on the printed sheet

______ p. Plate picking up ink in the clear areas and transferring it to the clear area of the sheet

______ q. Ink building up on rollers, plate, and/or blanket

______ r. Ink tearing away part of the paper coating as the sheet is printed; this appears as black spots in the blank areas of the printed sheet and white spots in the solid areas

______ s. Ink flying into atmosphere as fine mist, especially at high temperature and speed

______ t. Ink adhering to nonimage area of plate and transferring to printed sheet because of lack of dampening

______ u. Substructure used to raise the blanket surface to bearer height

Objective 2

List seven advantages of a routine, thorough preventive maintenance program.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

Objective 3

Name the three areas of work in a preventive maintenance program.

a. ______________________________

b. ______________________________

c. ______________________________

Objective 4

Match the preventive maintenance schedules with their descriptions.

1. Daily 2. Monthly 3. Weekly

_____ a. The regular cleaning that takes place after a day's run; the most important of the preventive maintenance schedules

_____ b. Usually takes place at the end of the work week; designed for blanket rotation or protection of other press elements while the press is not in use

_____ c. Supplements daily and weekly cleaning and includes a complete cleaning of the total press from the top to the floor

Objective 5

Select true statements concerning requirements for a preventive maintenance schedule in chart form by placing an "X" in the appropriate blanks.

_____ a. A preventive maintenance chart should include the three categories of work: cleaning, lubricating, and adjusting.

_____ b. Each category should have columns for listing the time when work should be done: daily, weekly/biweekly, or monthly.

_____ c. Each maintenance activity on the chart should have a block for marking the date when the maintenance was performed.

_____ d. The operator's manual and other manufacturer's guides should be referenced for lubrication and adjustments.

_____ e. The back side of the PM chart should provide space to log the date problems occur, what the problems are, and how the problems are solved.

Objective 6

Select true statements concerning preventive maintenance procedures for daily cleanup by placing an "X" in the appropriate blanks.

Ink system

_____ a. Use the blanket wash normally used for cleaning the blanket during the press run to clean ink rollers.

_____ b. Clean only parts that seem to need cleaning.

Dampening system

_____ c. Wipe ink particles from roller cover using a cotton pad dampened with fountain solution.

_____ d. Remove covered rollers from press and loosen ink with blanket wash, then flush blanket wash from cover with running water.

_____ e. Remove excess moisture from cover by rolling the roller with open palms on top of used rags on a flat surface.

_____ f. Clean metal dampening rollers with plate cleaner or a water miscible cleaner or pumice powder and water to remove all ink, oil, or residue that repels water.

_____ g. A coating of blanket wash may be applied to metal rollers after cleaning.

_____ h. Change dampening roller cover if enough ink has been trapped on the surface to form an ink glaze that appears shiny.

Cylinders

_____ i. Use plate cleaner or nonabrasive water miscible cleaner on plate cylinder, then coat with plate etch.

_____ j. Thoroughly clean blanket with blanket wash and water, then clean blanket cylinder ends and dry blanket.

_____ k. Wipe ink from surface of impression cylinder with plate etch, or remove ink with blanket wash or deglazer, then clean with plate cleaner, degreaser, or water miscible cleaner, then coat with etch.

Press

_____ l. Use a shop towel dampened with water.

_____ m. Wipe ink, paper lint, dust, and oil from side covers, side frames, support bars, camshafts, and gear shafts.

Workstation

_____ n. Clean work table surface.

_____ o. Clean chemical shelf; wipe containers.

_____ p. Place dirty shop towels in safety can.

_____ q. Place all waste paper somewhere out of the way.

_____ r. Arrange workstation in orderly manner.

Objective 7

List six preventive maintenance procedures for weekly cleanup.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

Objective 8

List five preventive maintenance procedures for monthly cleanup.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

Objective 9

Select correct procedures for daily, weekly, and monthly lubrication by placing an "X" next to the appropriate statements.

_____ a. Unplug the power supply; never lubricate a press while it is running.

_____ b. Use whatever lubricants are available.

_____ c. The best time for daily lubrication is at the end of the day's run.

_____ d. All friction points of all exposed moving parts should be lubricated weekly.

_____ e. Monthly lubrication should follow monthly cleanup before covers are replaced.

Objective 10

Complete the following list of daily and weekly adjustment procedures.

a. ____________________

b. Adjustments should be made as necessary to make-ready for each job order and should be made at will as needed.

c. Weekly adjustments should be those necessary to troubleshoot and solve problems.

Written Test

Objective 11

List three monthly adjustment requirements.

a. ______________________________

b. ______________________________

c. ______________________________

Objective 12

Arrange in order the steps in making an ink form roller check by writing a "1" for the first step, a "2" for the second step, and so on.

_____ a. Uniform stripes of ink 1/8" to 3/16" wide indicate proper adjustment.

_____ b. Irregular ink stripes indicate either uneven settings or worn rollers, and adjustments should be made to correct the problem.

_____ c. Ink up the press.

_____ d. Gently drop the ink form rollers to the plate, then lift them.

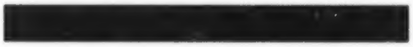
_____ e. Turn the handwheel to bring the plate around for inspection.

Objective 13

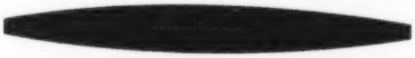
Identify the ink stripe configurations illustrated by matching them with their descriptions.

1. Setting uneven
2. Ideal setting
3. Roller swollen at ends
4. Low area in center
5. Roller worn at ends

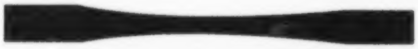
_____ a.



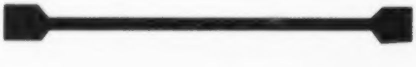
_____ b.



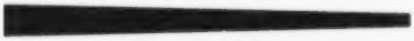
_____ c.



_____ d.



_____ e.



Objective 14

Arrange in order the sequence of troubleshooting techniques by writing a "1" for the first step, a "2" for the second step, and so on.

_____ a. Identify specific symptoms of the problem.

_____ b. List the probable causes.

_____ c. List possible solutions for each cause.

_____ d. Make no assumptions.

_____ e. Look for the simple cause and the simple solution.

Objective 15

List four categories of press troubles.

a. ____________________

b. ____________________

c. ____________________

d. ____________________

Objective 16

Distinguish between the two types of emulsification by placing an "X" beside the statement that reflects what happens when there is excess water in ink.

_____ a. Causes ink to pile on rollers, plate and/or blanket producing a grayed image on sheet

_____ b. Produces overall tint in background area on the printed sheet

Objective 17

Describe the technique for avoiding emulsification.

____

____

Objective 18

Select from the following list conditions creating ink drying problems by placing an "X" in the appropriate blanks.

_____ a. Relative humidity

_____ b. Not enough moisture run on the press

_____ c. pH of fountain solution

_____ d. Type of printing paper

_____ e. pH of printing paper

_____ f. Too much oxygen

_____ g. Temperature

Written Test

Objective 19

Match common ink problems on the press with their descriptions.

1. Chalking
2. Misting
3. Picking
4. Piling
5. Scumming
6. Set-off
7. Tinting
8. Toning
9. Trapping

_____ a. Ink is transferred from the front surface of one sheet to the back surface of the sheet above in the delivery pile.

_____ b. Ink on the paper turns dry and powdery.

_____ c. Ability of an ink to print over a previously applied ink is impaired.

_____ d. Emulsified ink suspended in the fountain solution on the plate surface appears as a uniform tint on the printed sheet.

_____ e. Plate picks up ink in the clear areas and transfers it to the clear areas of the sheet.

_____ f. Ink builds up or piles on rollers, plates, and/or blanket.

_____ g. Ink tears away parts of the paper coating as the sheet is printed; these appear as black spots in the blank areas of the printed sheet and white spots in the solid areas.

_____ h. Ink flies into the atmosphere as fine mist, especially at high temperature and speed.

_____ i. Ink adheres to nonimage area of plate because of lack of dampening and transfers to printed sheet.

Objective 20

List four guidelines for evaluating good print quality.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

Written Test

Objective 21

Match print quality problems with their causes.

1. Gray, washed out dirty background
2. Gray, washed out
3. Image breakdown during run
4. Paper curling in receiver
5. Scumming
6. Weak spots
7. Double image
8. Streaking
9. No image at all
10. Copy too dark
11. Paper missing grippers
12. Paper nicking on edge
13. Paper wrinkling
14. Uneven printing
15. Improper register

_____ a. Background dirty because of too much ink, not enough moisture, dirty dampener roll covers, or dampener covers tied too tightly on ends

_____ b. Not enough ink, too much moisture, wrong color of ink, incorrect dampener form roller pressure, incorrect plate-to-blanket pressure, or incorrect impression-to-blanket pressure

_____ c. Glazed ink rollers, glazed blanket, too much ink form roller pressure, or too much dampener form roller pressure

_____ d. Too much ink, too much impression-to-blanket pressure, not enough plate-to-blanket pressure, or too many revolutions on blanket without paper going through causing buildup on blanket

_____ e. Incorrect ink distribution, glazed rollers, incorrect dampener form roller parallel pressure, poor paper surface, incorrect ink form roller parallel pressure, incorrect plate-to-blanket parallel pressure, incorrect impression-to-blanket parallel pressure, or dirty impression cylinder

_____ f. Loose blanket, too much ink and fountain solution, not enough plate-to-blanket pressure, loose plate, or incorrect impression-to-blanket pressure

_____ g. Incorrect plate-to-blanket pressure, incorrect impression-to-blanket pressure, low spots in blanket, tacky ink, tacky blanket, dirty impression cylinder, or blind image on plate caused by dried gum or too strong fountain solution

_____ h. Too much dampening form roller pressure, too much ink form roller pressure, too much plate-to-blanket pressure, fountain solution too strong, or end play in form rollers

_____ i. Incorrect ink form roller pressure, incorrect dampener form roller pressure, incorrect plate-to-blanket pressure, incorrect impression-to-blanket pressure, improper ink, or loose blanket

_____ j. Loose blanket, side guides not set properly, paper not cut straight, or cam band not set

_____ k. Not enough ink roller form pressure, not enough plate-to-blanket pressure, not enough impression-to-blanket pressure, too much moisture, glazed blanket, or glazed ink rollers

_____ l. Too much moisture or a curl in the paper

_____ m. Paper stop fingers too high, feed rollers not set properly, or paper hitting back stop in receiver too hard

_____ n. Stop fingers incorrectly set or feed rollers out of adjustment

_____ o. Too much moisture, paper damp, too much pressure between blanket and impression cylinder, or register board not set properly

***Permission to duplicate this test is granted.**

Answers to Written Test

Objective 1

a. 12
b. 13
c. 4
d. 5
e. 21
f. 7
g. 9
h. 2
i. 15
j. 20
k. 6
l. 16
m. 3
n. 19
o. 17
p. 14
q. 11
r. 10
s. 8
t. 18
u. 1

Objective 2

Any seven of the following:

a. Prevents time loss due to press breakdown
b. Lengthens life of rollers and blanket
c. Aids in delivering a clean product
d. Prevents excessive wear on moving parts
e. Insures longer periods of trouble-free press operation
f. Increases production
g. Insures good image transfer
h. Provides opportunity to locate and correct potential problems on a scheduled basis rather than during a production breakdown
i. Helps operator to be aware of potential problems
j. Helps operator to become more familiar with press mechanical functions
k. Helps operator to identify and correct troubles
l. Presents an impressive, organized workstation for view by the employer, customers, or visitors

Objective 3

a. Cleaning equipment and work area
b. Lubricating equipment
c. Adjusting operator controllable settings on equipment

Objective 4

a. 1
b. 3
c. 2

Objective 5

a, b, c, d, e

Objective 6

a, c, d, f, h, i, j, k, m, n, o, p, r

Objective 7

Any six of the following:

a. Deglaze ink rollers and offset blanket.
b. Change blanket if rotation plan is followed.
c. Desensitize noncovered dampening rollers.
d. Degrease plate and impression cylinder surfaces.
e. Clean ink ductor cam truck or follower.
f. Clean plate clamps.
g. Clean delivery stripping rollers and rings or chain delivery clamps and paper turning wheels.
h. Wipe oil and dirt off floor area under press.
i. Clean and/or wash vacuum pump filters according to operator's manual.

Answers to Written Test

Objective 8

Any five of the following:

a. Unplug the power supply.
b. Remove all safety and dust covers.
c. Begin at the top of the press and work to the bottom of the press to remove all paper lint and dust from the total press.
d. Clean oil, ink, paper particles, and dirt from vacuum and drive motors, side frames, cams, gears, levers, shafts, cylinder ends, and all hard-to-reach areas of the press.
e. Flush press vacuum pump with a mixture of solvent and oil.
f. Clean vacuum and air blast filters, hoses, and air passages.
g. Clean upper and lower paper pull-out rollers or forwarding rollers.
h. Clean upper and lower paper feed rollers.

Objective 9

a, d, e

Objective 10

a. Student should not make adjustments until approved as an operator by the instructor.

Objective 11

Any three of the following:

a. Make an ink form roller check.
b. Adjust dampener rollers to plate cylinder.
c. Adjust ink form rollers to plate.
d. Adjust plate cylinder to blanket cylinder.
e. Adjust blanket cylinder to impression cylinder.

Objective 12

a. 4
b. 5
c. 1
d. 2
e. 3

Objective 13

a. 2
b. 5
c. 4
d. 3
e. 1

Objective 14

a. 3
b. 4
c. 5
d. 1
e. 2

Objective 15

Any four of the following:

a. Operator
b. Chemistry and ink
c. Paper stock
d. Image transfer process
e. Mechanical

Answers to Written Test

Objective 16

a

Objective 17

Run the minimum amount of ink to give the job full color and the minimum amount of dampening solution to keep the plate clean.

Objective 18

a, c, d, e, g

Objective 19

a. 6
b. 1
c. 9
d. 7
e. 5
f. 4
g. 3
h. 2
i. 8

Objective 20

Any four of the following:

a. Crisp, dark lines and solids
b. A clean background
c. Clean halftones, screens, and reverses
d. Good registration
e. Each sheet dried completely

Objective 21

a. 5
b. 2
c. 1
d. 10
e. 14
f. 7
g. 6
h. 3
i. 8
j. 15
k. 9
l. 4
m. 12
n. 11
o. 13

Unit 4

Preventive Maintenance and Troubleshooting

Prerequisites:
None

Learning Activities Sheet

Student Name ______________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 21.

☐ 4. **Study** Student Supplement 1, "Troubleshooting Guide for Ink and Dampening Problems."

☐ 5. **Do** Assignment Sheet 1, "Use a Troubleshooting Guide to Find the Best Solution to an Ink and Dampening Problem."

☐ 6. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 7. If the evaluation is not satisfactory, repeat steps 4 and 5.

☐ 7. **Study** Student Supplement 2, "Troubleshooting Guide for Paper Stock Problems."

☐ 8. **Do** Assignment Sheet 2, "Use a Troubleshooting Guide to Find the Best Solution to a Paper Stock Problem."

☐ 9. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 10. If the evaluation is not satisfactory, repeat steps 7 and 8.

☐ 10. **Study** Student Supplement 3, "Troubleshooting Guide for Registration Problems."

☐ 11. **Do** Assignment Sheet 3, "Use a Troubleshooting Guide to Find the Best Solution to a Registration Problem."

Learning Activities Sheet

☐ 12. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 13. If the evaluation is not satisfactory, repeat steps 10 and 11.

☐ 13. **Study** Student Supplement 4, "Troubleshooting Guide for Process (Image Transfer) Problems."

☐ 14. **Do** Assignment Sheet 4, "Use a Troubleshooting Guide to Find the Best Solution to a Process Problem."

☐ 15. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 16. If the evaluation is not satisfactory, repeat steps 13 and 14.

☐ 16. **Study** Student Supplement 5, "Troubleshooting Guide for Mechanical Problems."

☐ 17. **Do** Assignment Sheet 5, "Use a Troubleshooting Guide to Find the Best Solution to a Mechanical Problem."

☐ 18. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 19. If the evaluation is not satisfactory, repeat steps 16 and 17.

☐ 19. **Do** Assignment Sheet 6, "Determine Lubrication Requirements for a Specific Press."

☐ 20. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 21. If the evaluation is not satisfactory, repeat step 19.

☐ 21. **Do** Assignment Sheet 7, "Set Up a Preventive Maintenance Schedule in Chart Form."

☐ 22. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 23. If the evaluation is not satisfactory, repeat step 21.

☐ 23. **Do** Assignment Sheet 8, "Take an Inventory of Spare Parts."

☐ 24. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 25. If the evaluation is not satisfactory, repeat step 23.

☐ 25. **Observe** Demonstration of procedures to be used in completing Job Sheet 1.

☐ 26. **Do** Job Sheet 1, "Adjust Dampener Rollers to Plate Cylinder."

☐ 27. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 28. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat step 26.

☐ 28. **Observe** Demonstration of procedures to be used in completing Job Sheet 2.

☐ 29. **Do** Job Sheet 2, "Adjust Ink Form Rollers to Plate."

☐ 30. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 31. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 2 and repeat step 29.

☐ 31. **Observe** Demonstration of procedures to be used in completing Job Sheet 3.

☐ 32. **Do** Job Sheet 3, "Adjust Plate Cylinder to Blanket Cylinder."

☐ 33. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 34. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 3 and repeat step 32.

☐ 34. **Observe** Demonstration of procedures to be used in completing Job Sheet 4.

☐ 35. **Do** Job Sheet 4, "Adjust Blanket Cylinder to Impression Cylinder."

Learning Activities Sheet

☐ 36. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 37. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 4 and repeat step 35.

☐ 37. **Observe** Demonstration of procedures to be used in completing Job Sheet 5.

☐ 38. **Do** Job Sheet 5, "Change a Molleton Cover."

☐ 39. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 40. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 5 and repeat step 38.

☐ 40. **Observe** Demonstration of procedures to be used in completing Job Sheet 6.

☐ 41. **Do** Job Sheet 6, "Degrease Plate and Impression Cylinders."

☐ 42. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 43. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 6 and repeat step 41.

☐ 43. **Observe** Demonstration of procedures to be used in completing Job Sheet 7.

☐ 44. **Do** Job Sheet 7, "Deglaze Ink Rollers and Blanket."

☐ 45. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 46. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 7 and repeat step 44.

☐ 46. **Observe** Demonstration of procedures to be used in completing Job Sheet 8.

☐ 47. **Do** Job Sheet 8, "Change Blanket."

☐ 48. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 49. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 8 and repeat step 47.

Learning Activities Sheet

☐ 49. **Observe** Demonstration of procedures to be used in completing Job Sheet 9.

☐ 50. **Do** Job Sheet 9, "Backflush Vacuum Pump."

☐ 51. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 52. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 9 and repeat step 50.

☐ 52. **Check** With instructor for any additional assignments to be completed.

☐ 53. **Do** Additional assignments listed below.

____

____

____

☐ 54. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

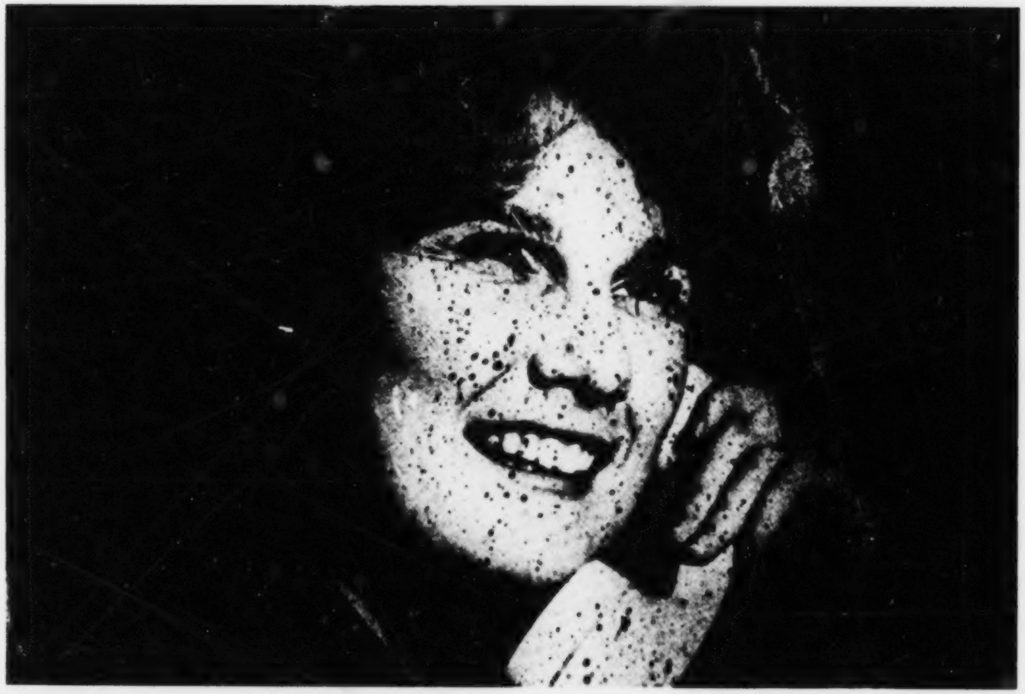
☐ 55. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

***Permission to duplicate this form is granted.**

Guidelines for Evaluating Good Print Quality

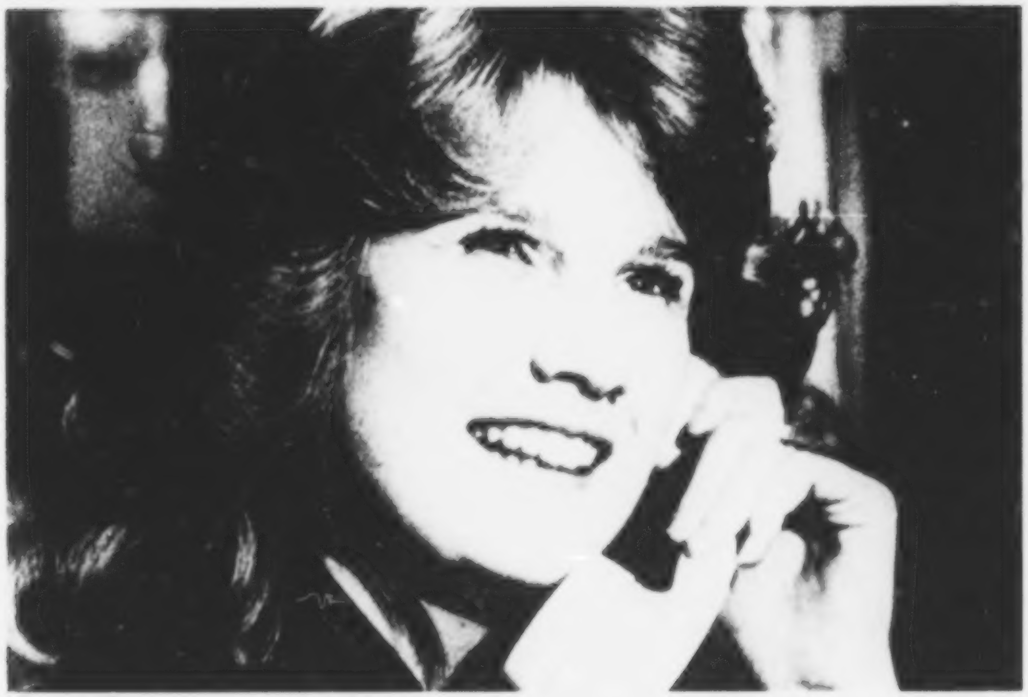
Crisp dark lines and solids • A clean background • Clean halftones, screens, and reverses
Good registration • Each sheet dried completely

Scumming



Too much ink • Not enough moisture • Dirty dampener roller covers
Dampener covers tied too tightly on ends

Gray, Washed Out

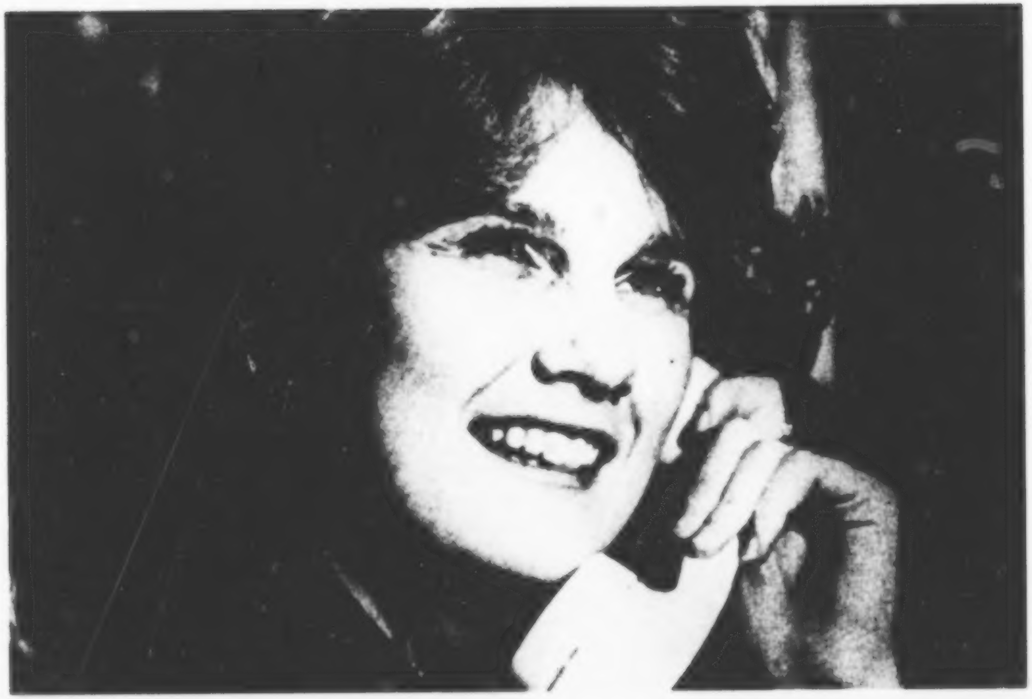


Not enough ink • Too much moisture • Wrong color of ink • Incorrect dampener form roller pressure
Incorrect plate-to-blanket pressure • Incorrect impression-to-blanket pressure

Gray, Washed Out Dirty Background

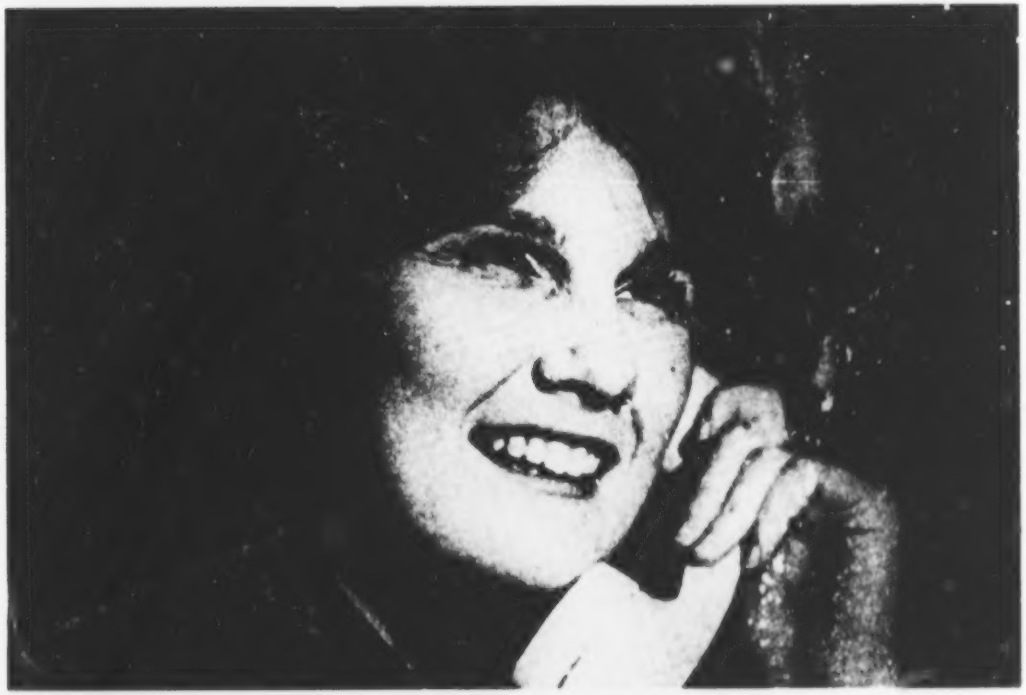
Glazed ink rollers • Glazed blanket • Too much ink form roller pressure
Too much dampener form roller pressure

Copy Too Dark



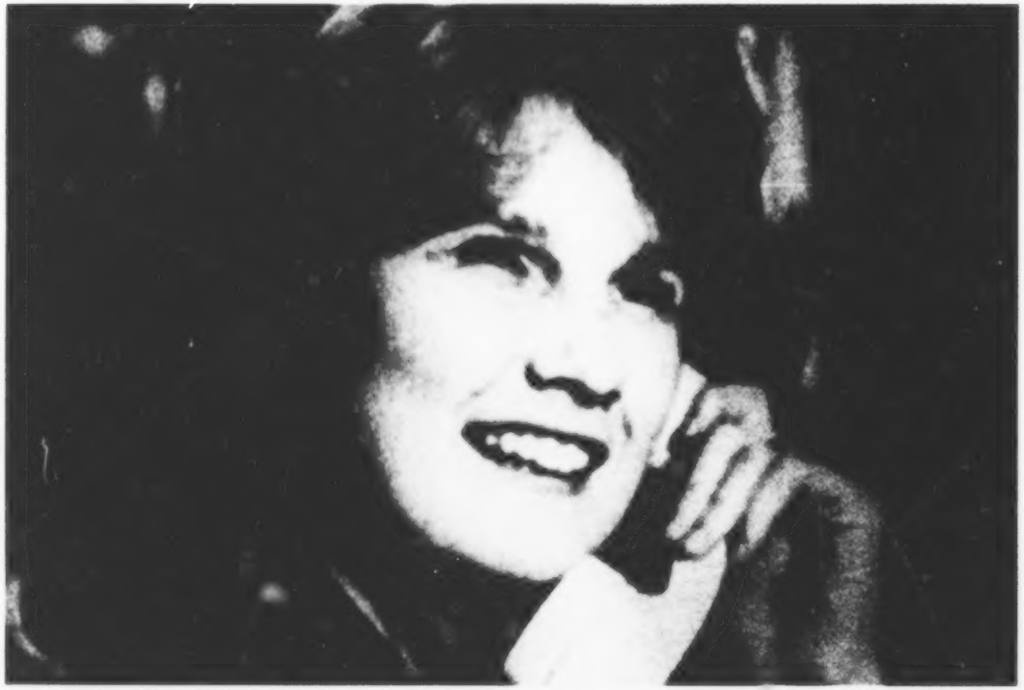
Too much ink • Too much impression-to-blanket pressure • Not enough plate-to-blanket pressure
Too many revolutions on blanket without paper going through (buildup on blanket)

Uneven Printing



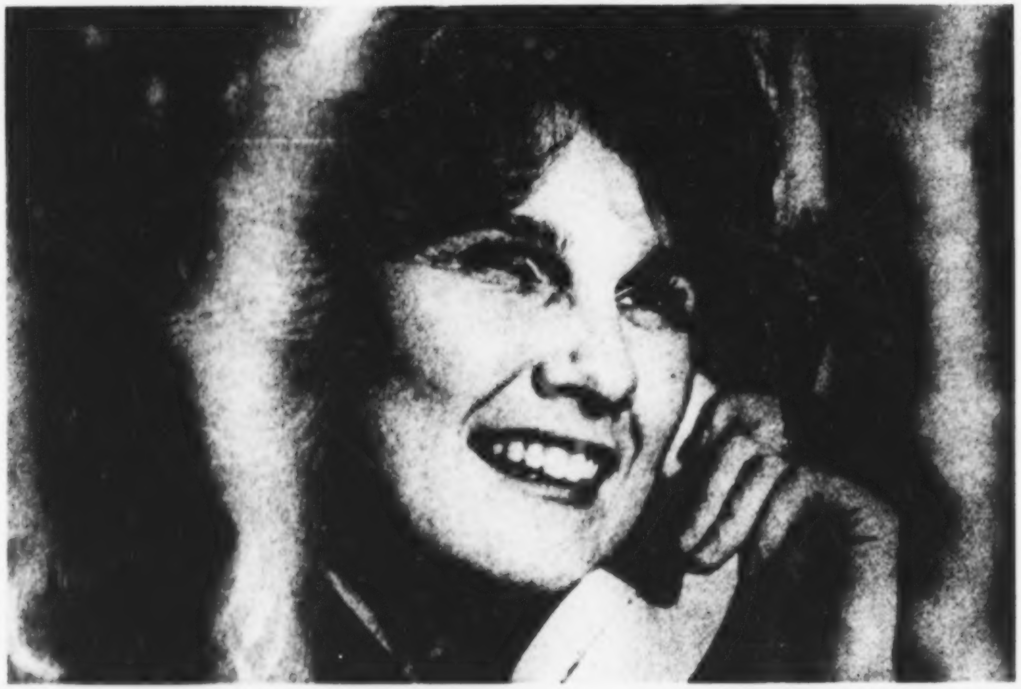
Incorrect ink distribution • Glazed rollers • Incorrect dampener form roller parallel pressure
Poor paper (surface of paper) • Incorrect ink form roller parallel pressure • Incorrect plate-to-blanket parallel pressure • Incorrect impression-to-blanket parallel pressure
Dirty impression cylinder

Double Image or Blurred Copy



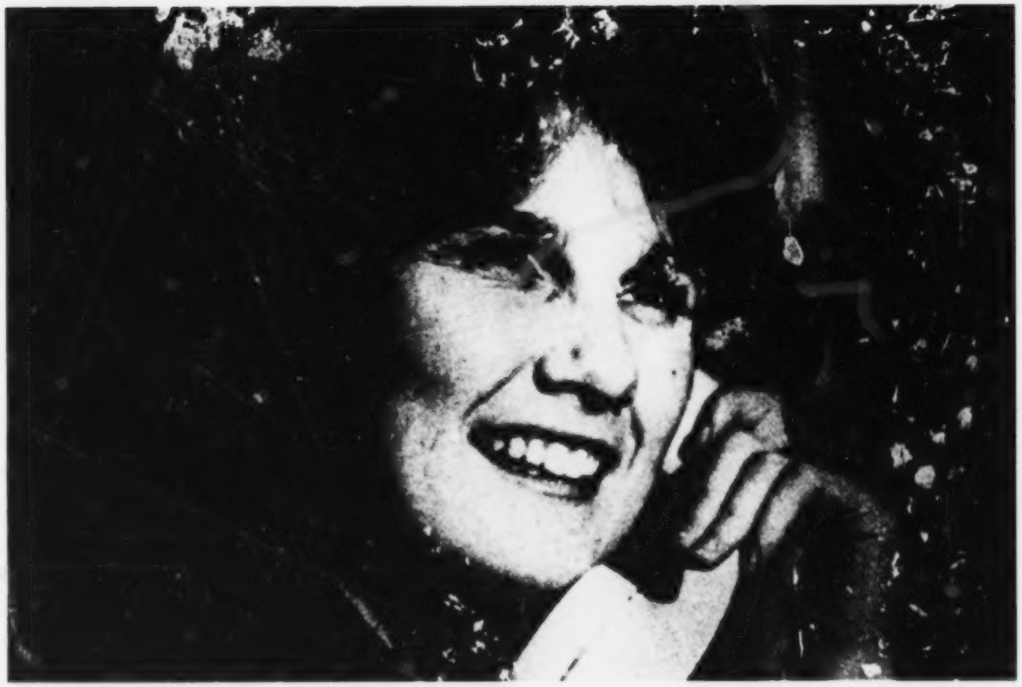
Loose blanket • Too much ink and fountain solution • Not enough plate-to-blanket pressure
Loose plate • Incorrect impression-to-blanket pressure

Weak Spots or Spotty Copy



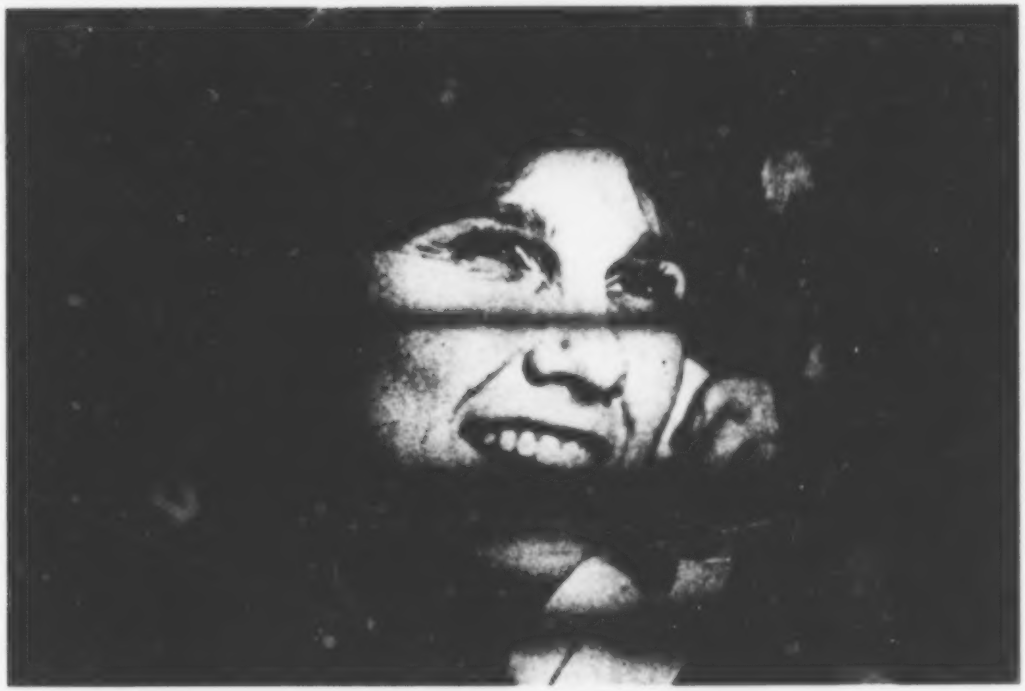
Incorrect plate-to-blanket pressure • Incorrect impression-to-blanket pressure
Low spots in blanket • Tacky ink • Tacky blanket • Dirty impression cylinder
"Blind" image on plate caused by dried gum or too strong fountain solution

Image Breakdown During Run



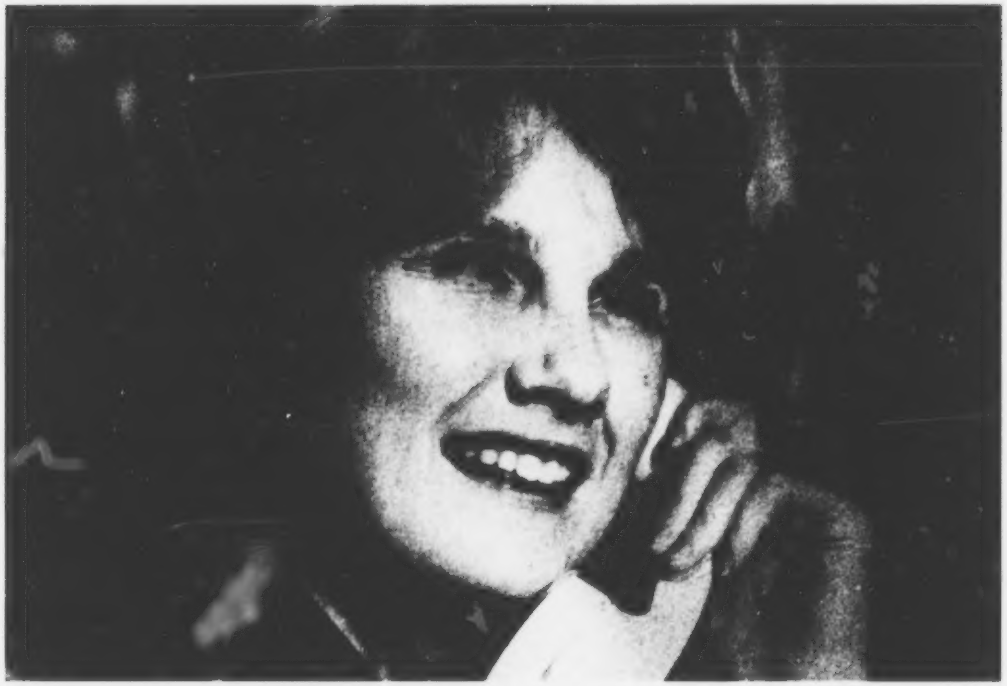
Too much dampener form roller pressure • Too much ink form roller pressure
Too much plate-to-blanket pressure • Fountain solution too strong • End play in form rollers

Streaking



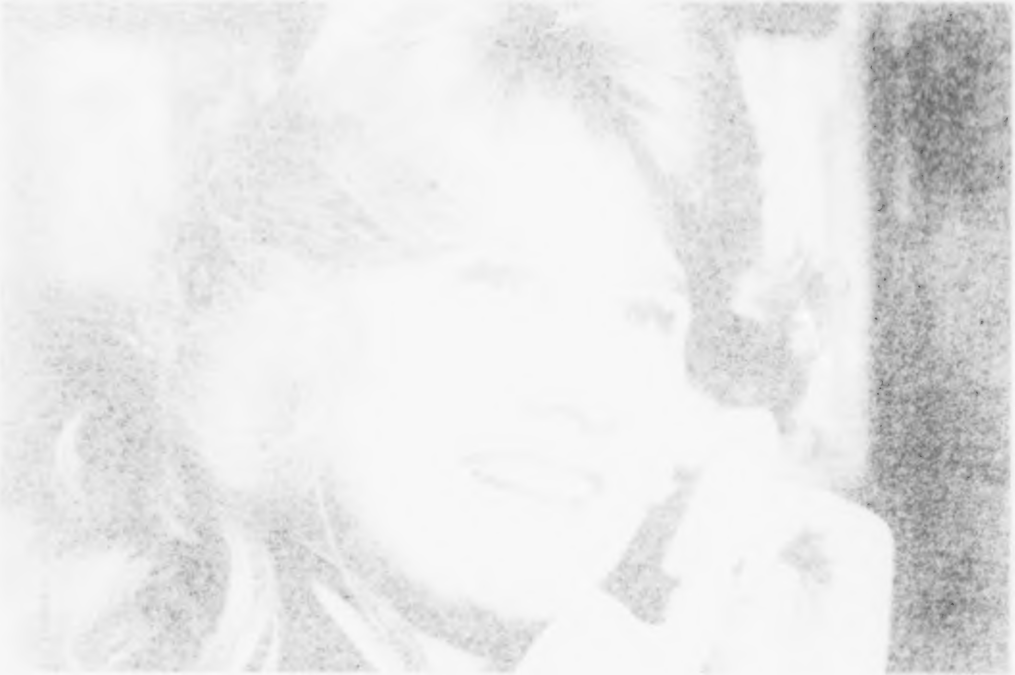
Incorrect ink form roller pressure • Incorrect dampener form roller pressure
Incorrect plate-to-blanket pressure • Improper ink • Loose blanket

Improper Registration



Front paper guide too tight • Control wheel too loose
Vacuum tubes out of adjustment • Jogger side guides set too loose

No Image at All

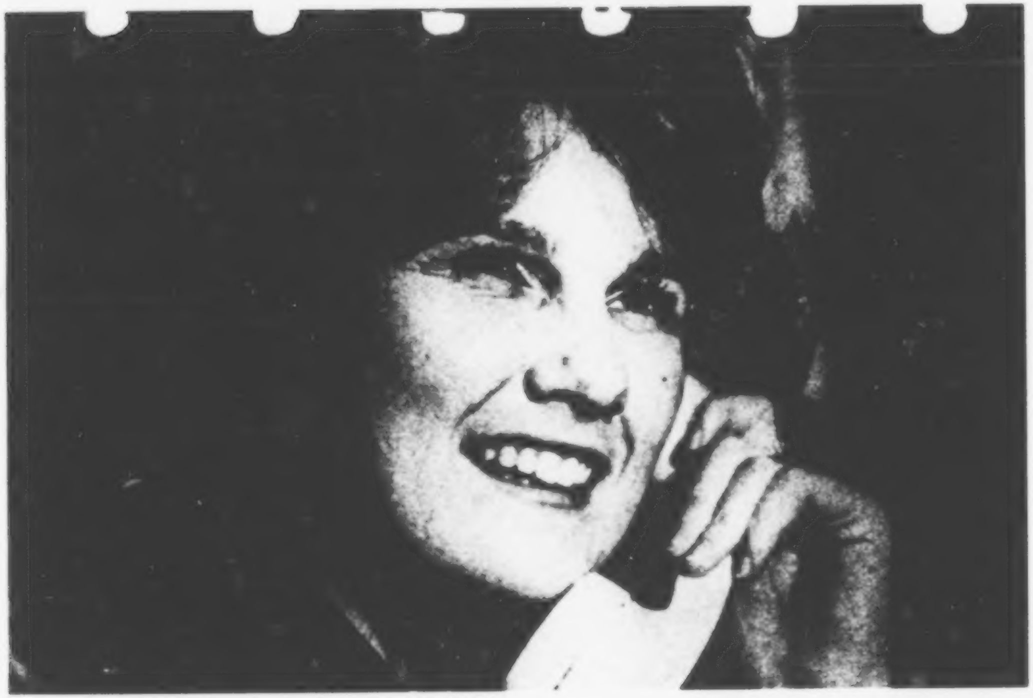


Not enough ink roller form pressure • Not enough plate-to-blanket pressure
Not enough impression-to-blanket pressure • Too much moisture
Glazed blanket • Glazed ink rollers

Paper Curling in Receiver

Too much moisture • Curl in paper

Paper Nicking on Edge

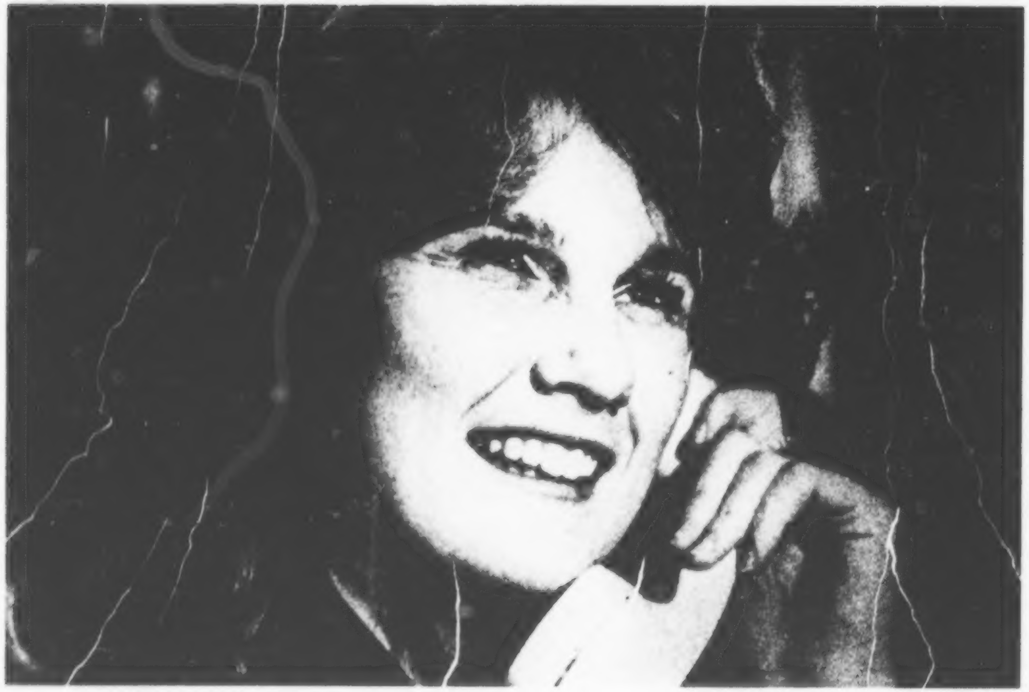


Paper stop fingers too high • Feed rollers not set properly
Paper hitting back stop in receiver too hard

Paper Missing Grippers

Stop fingers incorrectly set • Feed rollers out of adjustment

Paper Wrinkling

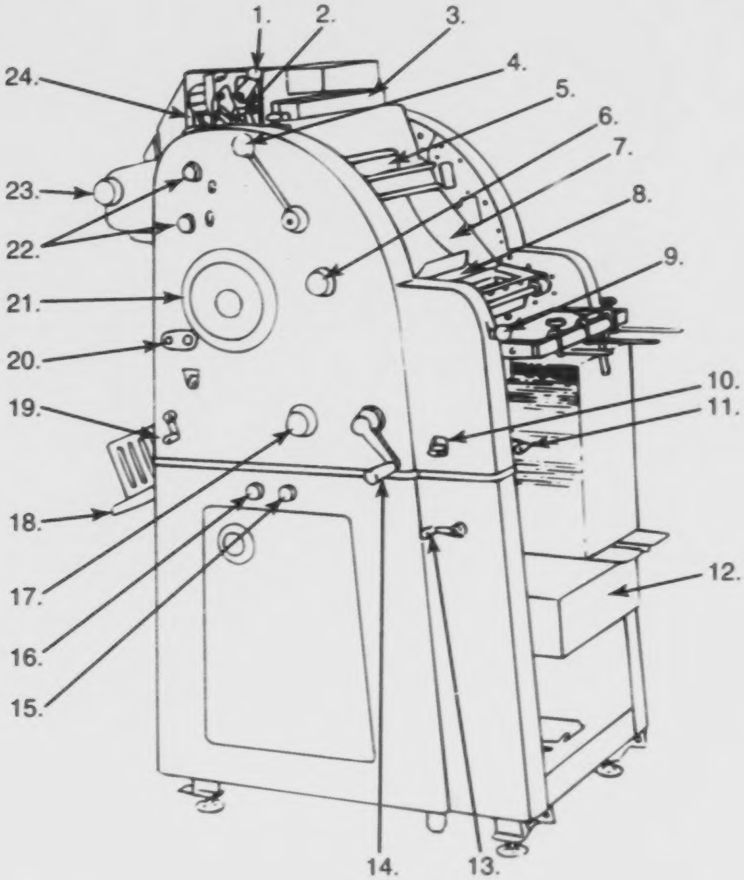


Too much moisture • Paper damp • Too much pressure between blanket and impression cylinder
Register board not set properly

Assignment Sheet 1

Figure 1

A. B. Dick Model 360



1. Aquamatic night latch handle
2. Aquamatic control
3. Fountain solution trough
4. Operation control lever
5. Master cylinder
6. Vertical copy adjusting lock
7. Blanket cylinder
8. Copy counter
9. Paper feed lever
10. Table release
11. Paper stack height adjustment
12. Feed table
13. Paper guide crank
14. Paper elevator crank
15. Vacuum control
16. Air control
17. Buckle control
18. Receiving tray
19. Speed control
20. Motor drive and vacuum pump switches
21. Handwheel
22. Form roller control knobs
23. Ink fountain roller knob
24. Aquamatic lock-out latch

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Figure 2

A. B. Dick Model 360 with T-Head

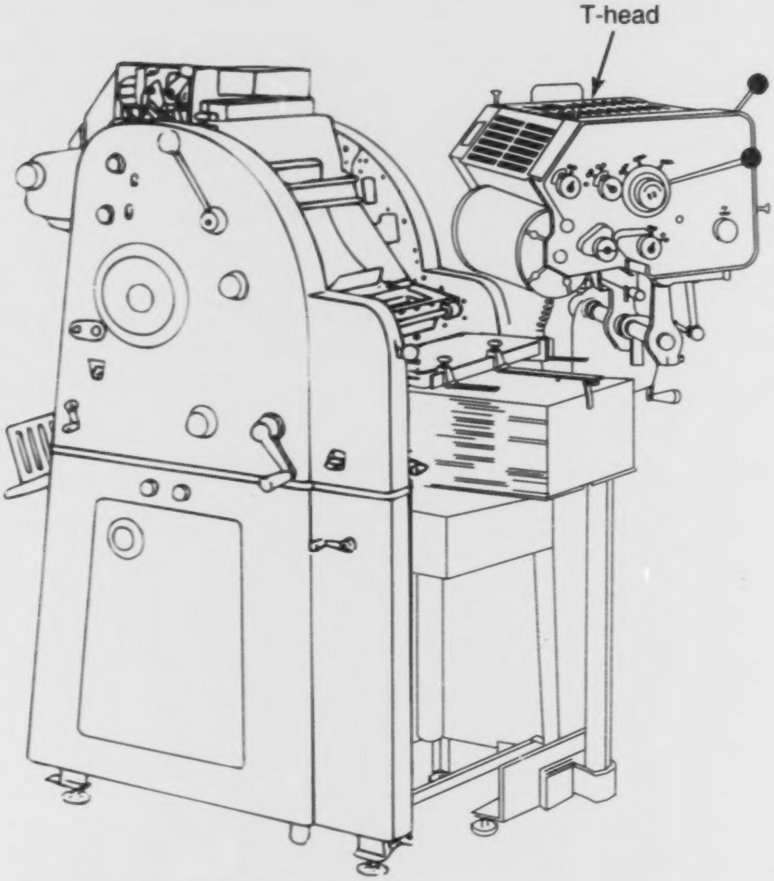
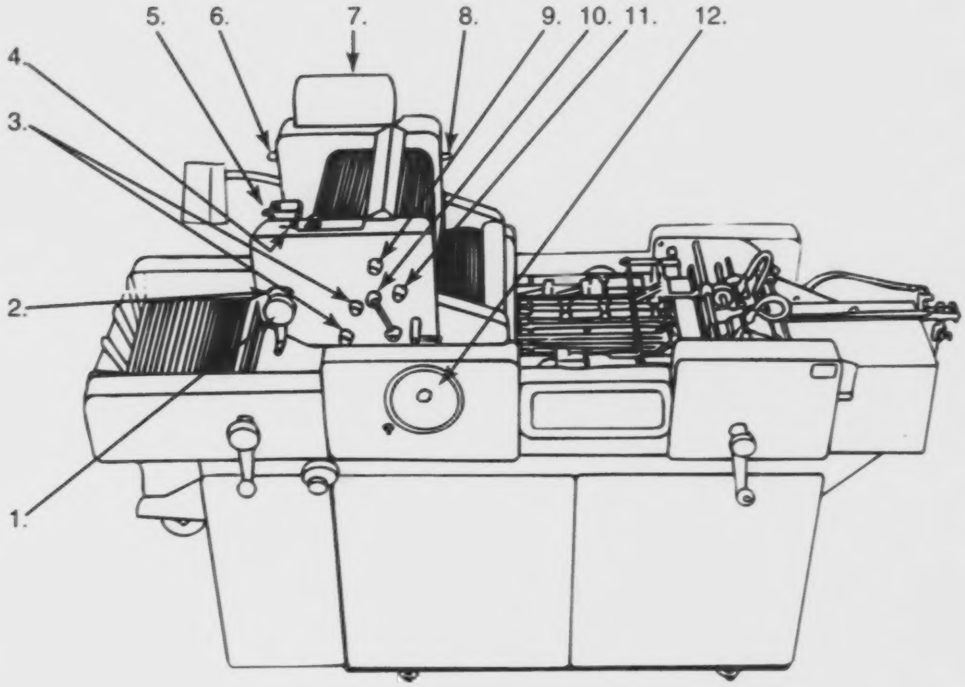


Illustration of A.B. Dick Model 360–©1999 A.B. Dick Company
Illustration of T-head courtesy of Townsend Industries, Inc.

Figure 3

AM Multigraphics® Model 1650



1. Ink fountain roller crank
2. Ink feed rate control
3. Ink form roller knobs
4. Auto ink override
5. Ink ductor shut-off
6. Moisture feedrate control
7. Night latch knob (far side)
8. Moisture ductor control lever
9. Moisture fountain roller knob
10. Single lever control
11. Moisture form roller knob
12. Handwheel

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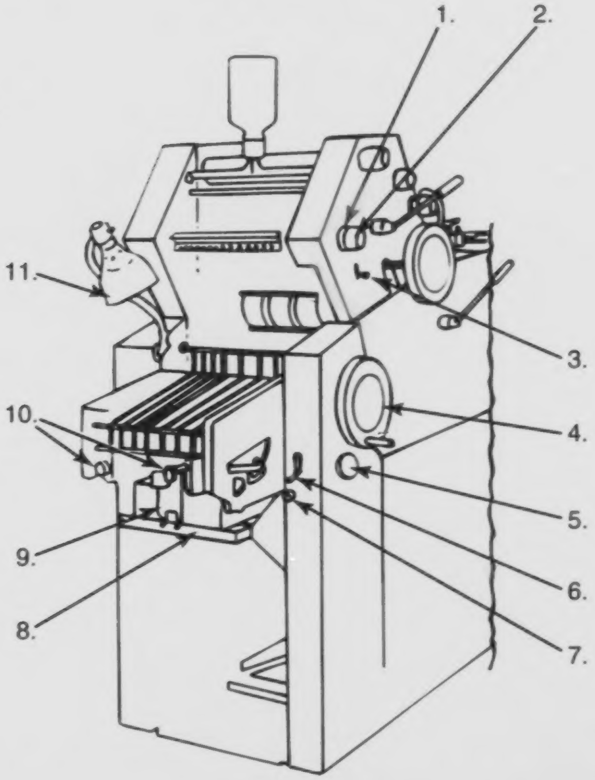
Figure 4

Chief 15 and Chief 17 (Delivery End)



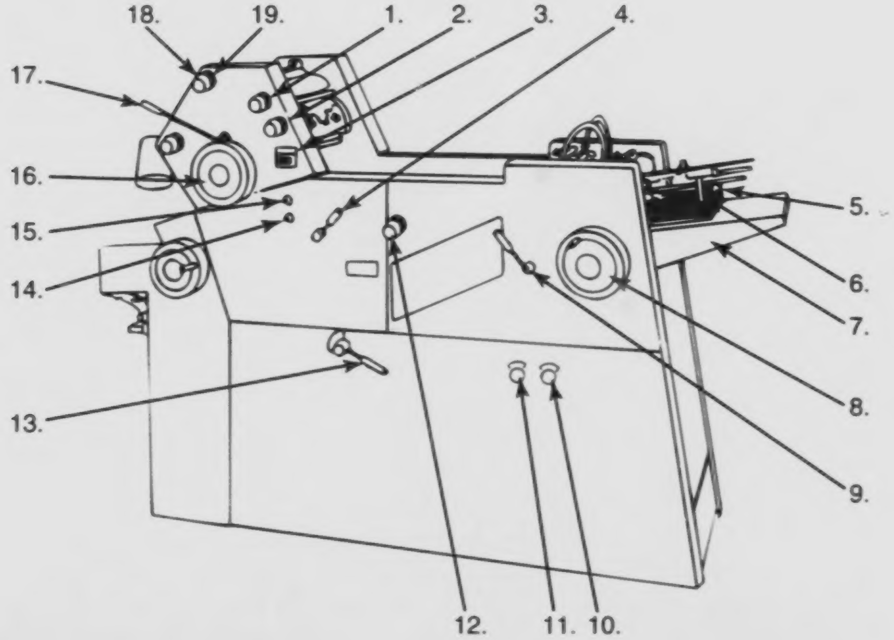
1. Ink volume control
2. Ink fountain roller control knob
3. Ink fountain manual control lever
4. Delivery pile handwheel
5. Delivery rate lowering control
6. Delivery lock release
7. Delivery paper feed control
8. Delivery board
9. Delivery sheet stop
10. Delivery side guide control knobs
11. Delivery light

Courtesy American Type Founders Co., Inc.

Assignment Sheet 1

Figure 5

Chief 15 (Left Side)

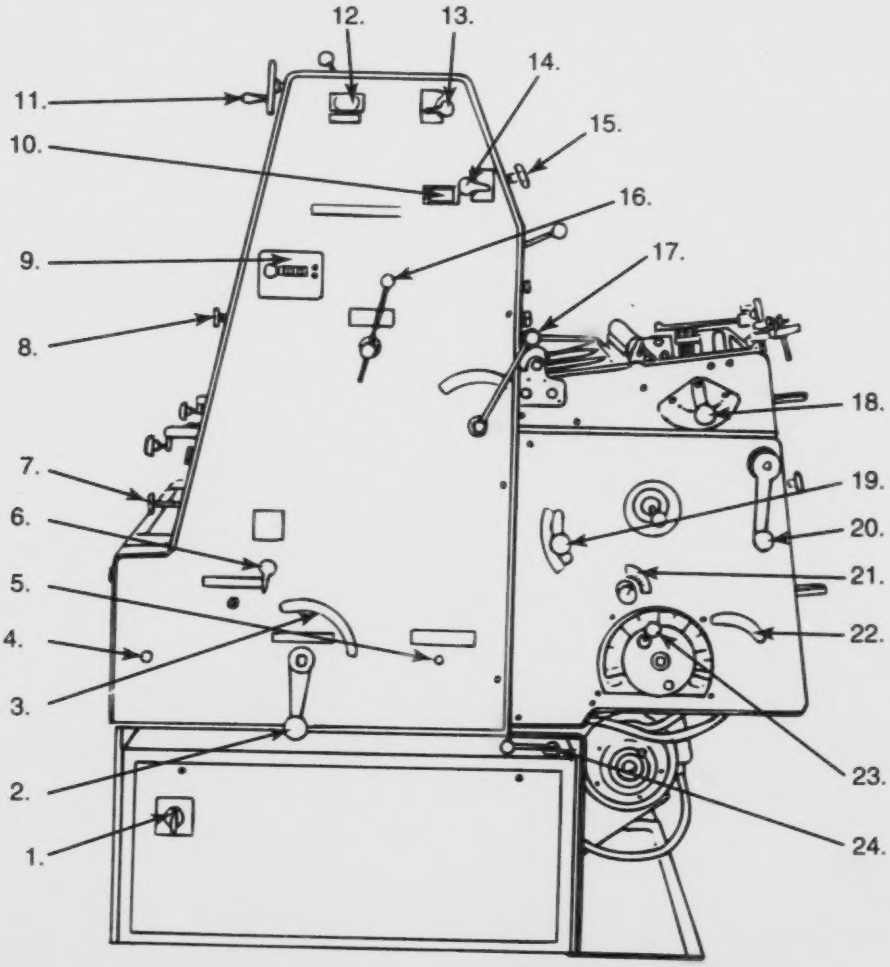


1. Auxiliary dampener form roller control knob
2. Vertical positioning control knob
3. Automatic copy counter
4. Manual plate-to-blanket impression control
5. Paper stack back guide
6. Left and right paper stack side guides
7. Paper platform
8. Paper platform handwheel
9. Back paper feed control
10. Vacuum control
11. Air blow control
12. Left and right jogger control knobs
13. Speed control lever
14. Air-vacuum pump switch
15. Drive motor switch
16. Handwheel
17. Dampener and ink form roller control lever
18. Dampener fountain roller control knob
19. Dampener volume control

Courtesy American Type Founders Co., Inc.

Figure 6

Heidelberg GTO



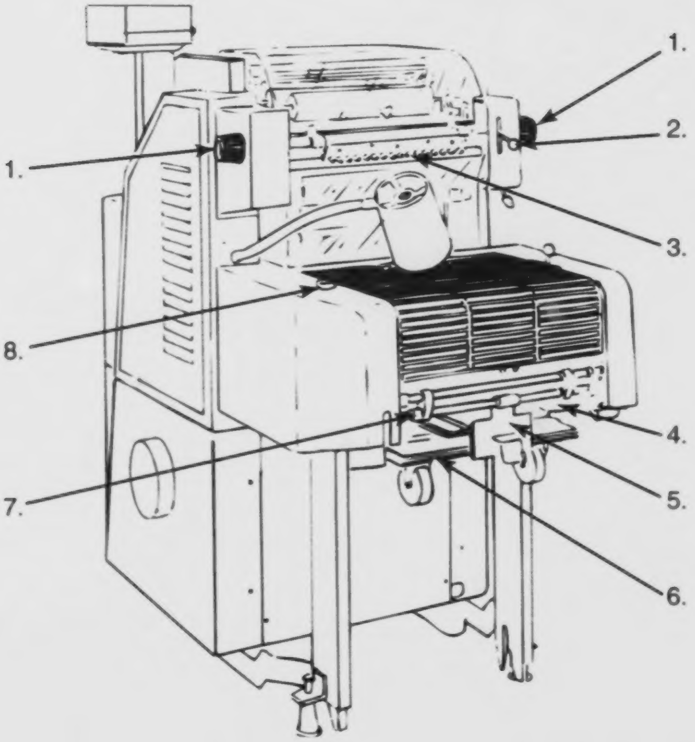
1. Main switch
2. Hand crank for delivery stack adjustment
3. Lever for automatic delivery stack transport
4. Delivery sheet jogger control
5. Rear sheet stop delivery adjustment pivot
6. Numbering machine interrupter
7. Numbering machine printing pressure adjustment
8. Printing pressure adjusting discs
9. Sheet counter
10. Water stripe control indicator
11. Handwheel for ink stripe control
12. Ink stripe control indicator
13. Ink supply control lever
14. Water supply control lever
15. Star handle for water stripe control
16. Ink form roller control lever
17. Single-lever control for all main press functions
18. Automatic feed stack indicator
19. Star handle for sucker bar adjustment
20. Crank for manual feed stack adjustment
21. Star handle with indicator and scale for air blast pipes
22. Automatic feed stack adjustment lever
23. Hand crank variable speed control
24. Control light

Courtesy Heidelberg USA, Inc.

Assignment Sheet 1

Figure 7

Itek 975—(Nonoperation Side)



1. Ink fountain roller knob	5. Front guide for delivery
2. Ink feed volume adjustment lever	6. Delivery table
3. Ink volume adjustment screws	7. Side guide for delivery
4. Side jogger for delivery	8. Air blower control knob (Type XLD)

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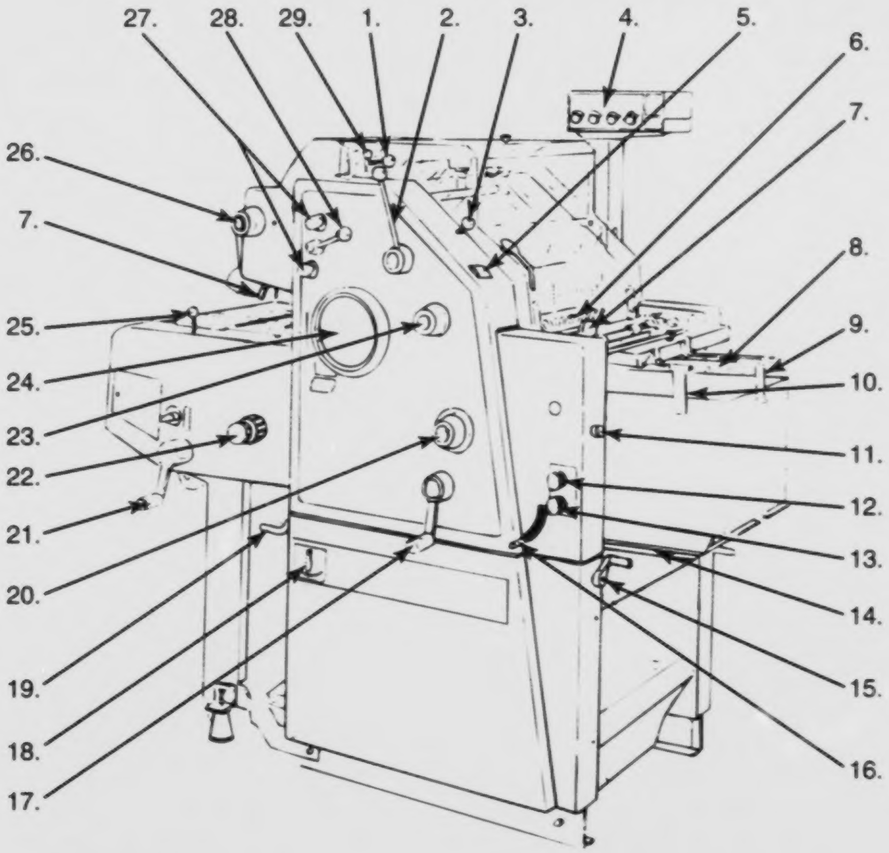
Figure 8

Itek 975—(Operation Side)



1. Water ductor lever
2. Operating lever
3. Clamp lever
4. Operating panel (Type XLD)
5. Total counter
6. Suction feet
7. Feed lever
8. Micro side guide
9. Back guide
10. Side guide
11. Height control bar adjustment knob
12. Vacuum adjustment knob
13. Blower adjustment knob
14. Paper feed table
15. Vertical guide handle
16. Release lever
17. Crank handle for paper feed table
18. Speed meter
19. Speed change handle
20. Impression pressure dial
21. Crank handle for delivery table
22. Back guide adjustment handle
23. Vertical adjustment knob
24. Handwheel
25. Delivery table automatic lowering lever
26. Ink fountain roller knob
27. Form roller shaft knob
28. Ink form roller night latch lever
29. Water volume adjustment lever

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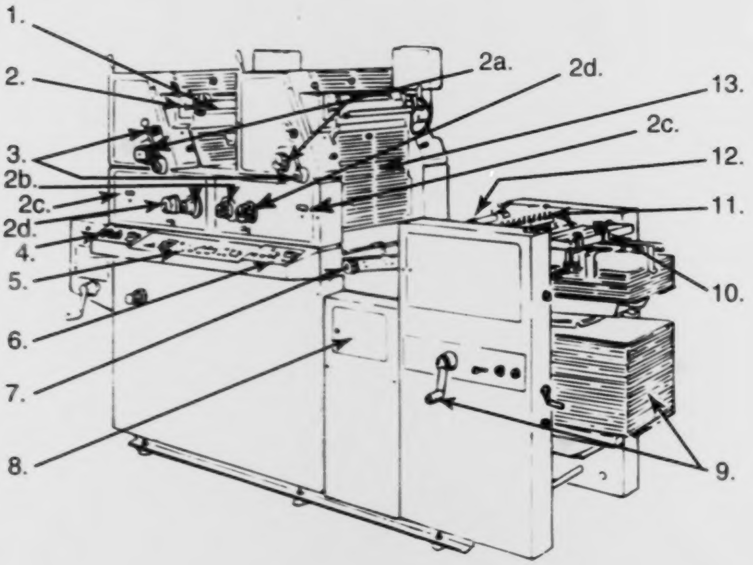
Figure 9

Itek 3985 (Operation Side)



1. Water section
2. Water adjustment dial
    a. Lateral image adjustment dial
    b. Impression pressure adjustment dial
    c. Plate pressure adjustment screw
    d. Vertical image adjustment dial
3. Operating lever
4. Second unit control sub-panel
5. Control panel
    - Drive switch
    - Speed control
    - Counter
    - OK monitor
6. First unit control sub-panel
7. Push side lay
8. Sub-panel
9. Feeder pile
10. Feeder
11. Static eliminator
12. Feed board
13. Plate cylinder, blanket cylinder, upper feed roller

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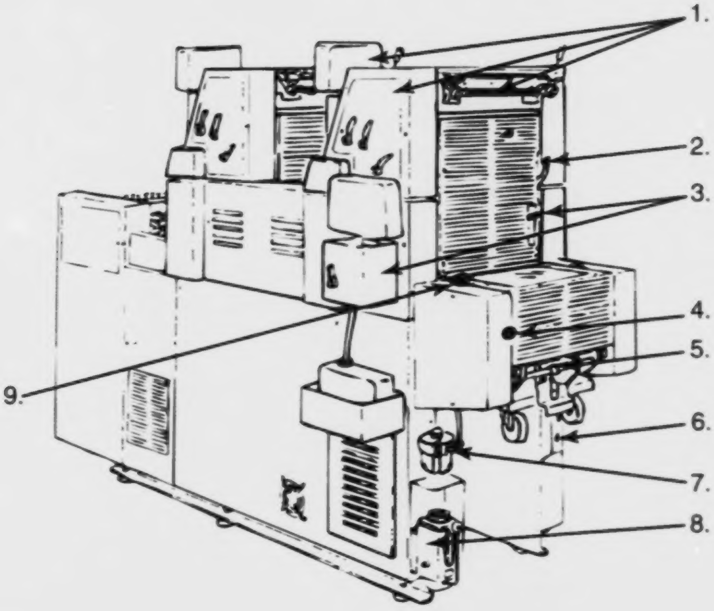
Figure 10

Itek 3985 (Nonoperation Side)



1. Water section, ink section
2. Ink roller cleanup attachment
3. Blanket cleaning device
4. Delivery air blower
5. Delivery guide
6. Delivery control panel
   - Main switch
7. Spray device
8. Centralized oiling device
9. Emergency stop button

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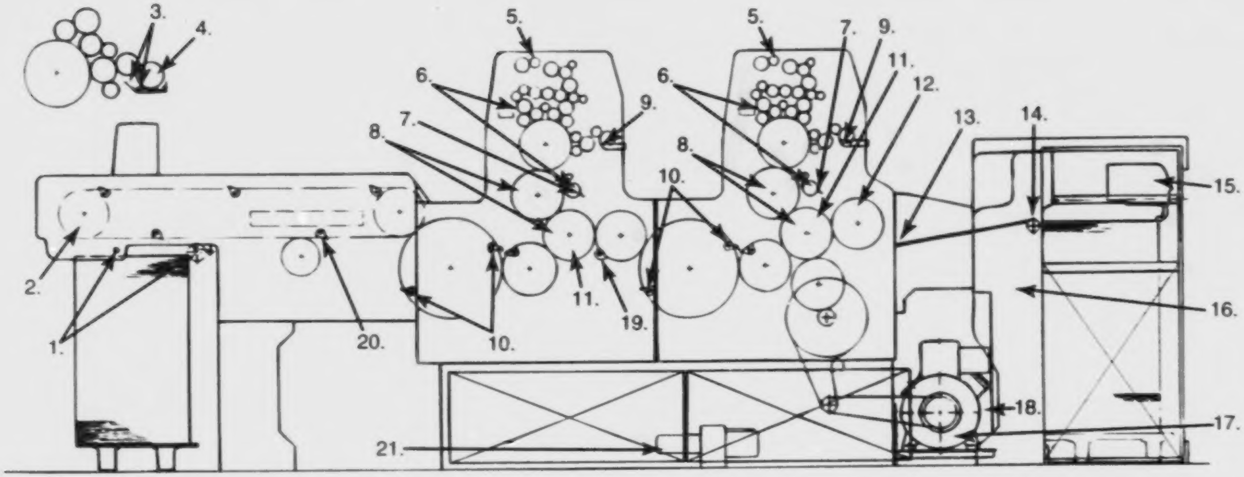
Heidelberg M-Offset 19″ x 25 1/2″

Multicolor • Perfector • High-Pile Delivery

Figure 11

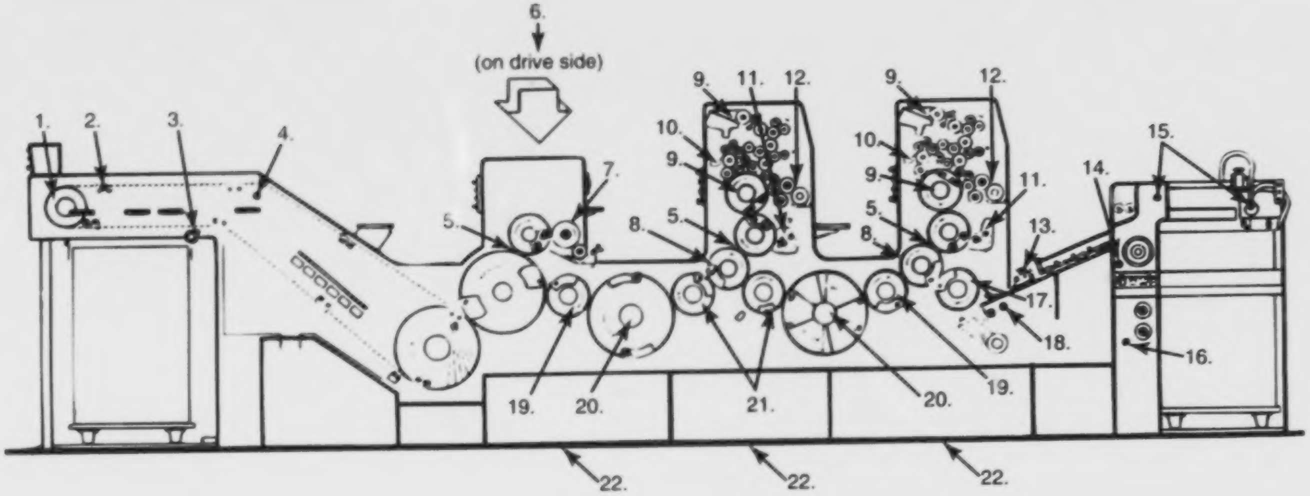


1. Delivery (bearings for sheet joggers, suction wheel drive, bearings for suction wheels)
2. Delivery (bearings for chain sprocket, roll for opening grippers)
3. ALCOLOR—Intermediate gears and bearing plate
4. ALCOLOR—Bearing for water pan roller
5. Inking unit
6. Wash-up blade
7. Rubber blanket wash-up device
8. Cylinders and bearers
9. Dampening unit
10. Transfer drum and cylinder/storage drum
11. Impression cylinder
12. Heidelberg register feed drum
13. Feeder
14. Sheet transport
15. Suction head
16. Central lubrication
17. Motor
18. Compressor
19. Reversing cylinder
20. Delivery (bearings for gripper bar)
21. Vacuum pump

Courtesy Heidelberg USA, Inc.

Heidelberg Speedmaster 28 3/8″ x 40 1/8″

Figure 12



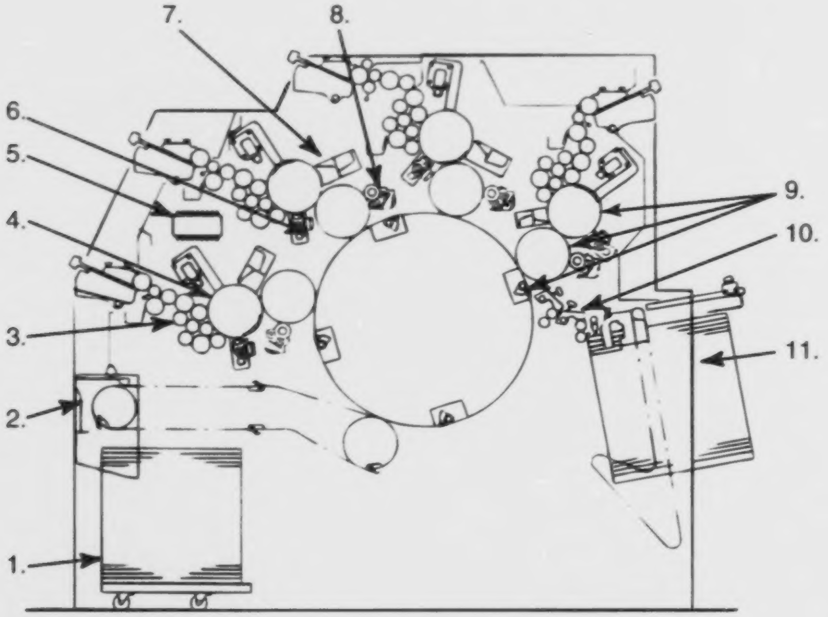
1. Bearing of chain sprocket on powder adjusting cam and gripper operating cam
2. Delivery
3. Suction drum
4. Pile lifting shaft
5. Bearers and gauge rings
6. Air filters
7. Coating unit
8. Impression cylinder
9. Inking units
10. Wash-up blade
11. Blanket washing device
12. ALCOLOR damping units
13. Bearing for shaft of pull side lay
14. Guiding sleeves for feeder tapes or corresponding shafts
15. Feeder
16. Bearing for lateral sheet stops
17. Feed drum
18. Photocells
19. Transfer cylinder
20. Transfer drum and storage drum
21. Transfer cylinder
22. Oil drip pans

Courtesy Heidelberg USA, Inc.

Assignment Sheet 1

Figure 13

Quickmaster DI 46-4
Digital Color Press

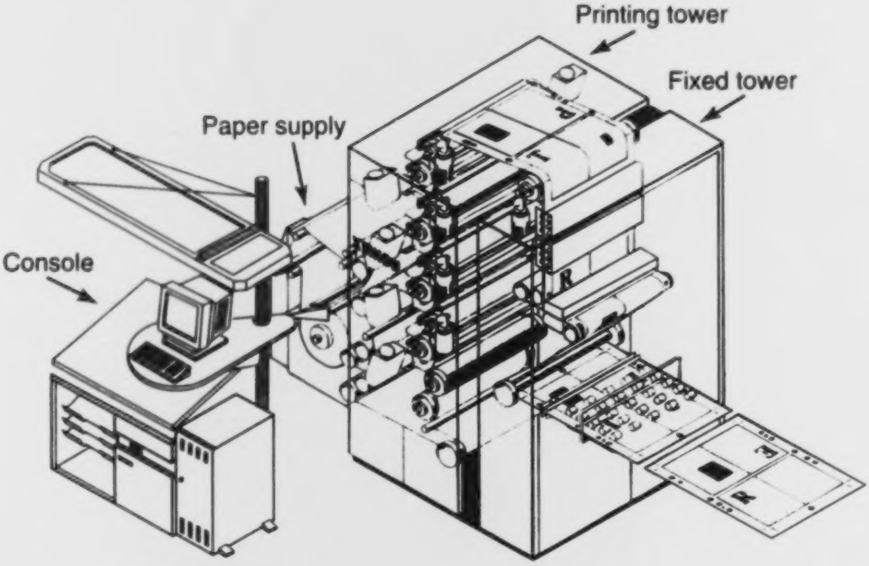


1. Powder spray device
2. Delivery
3. Inking unit
4. Plate cylinder
5. Central lubrication
6. Printing master wash-up device
7. Extraction device
8. Blanket wash-up device
9. Impression cylinders, bearers
10. Forwarding roller
11. Feeder

Courtesy Heidelberg USA, Inc.

Figure 14

Xeikon DCP/50D Digital Color Press


Printing tower
Fixed tower
Paper supply
Console

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Objective 8

Job Sheet 1—Set Up the Sheet Control Systems

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

Evaluation Criteria	Rating
• Feeder system set up according to instructions	______
• Register system set up according to instructions	______
• Delivery system set up according to instructions	______

Basic Skills

Reading Critical Thinking Employability Technology

Introduction

Before a successful press run can be accomplished, the press operator must set the press to handle a specific paper size from feed to delivery and maintain register of impression placement. To do that the operator must be skilled in the operation of the feeder, register, and delivery systems of the press. This exercise will give the student experience in these adjustments.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Paper stock, 8 1/2″ x 11″
- Operator's manual for specific press being used

Procedure

Caution: Do not make adjustments on press while it is running.

☐ 1. Check with instructor before beginning this job sheet.

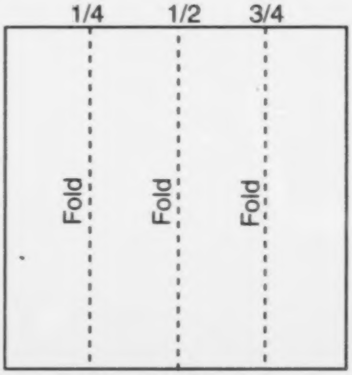
☐ 2. Set up feeder system.

    ☐ a. Position front guides for width of paper to be fed so sheet is centered sideways on the feed board.

☐ b. Set feed table extensions to support paper pile.

Note: Folding the sheet in half twice will divide it into fourths. Place the feed table extensions, the sheet separators, and the sucker tubes approximately at the 1/4 and 3/4 points. See Figure 1.

Figure 1



Sheet of Paper

☐ c. Place the support board for the paper pile on top of the feed table extensions.

> **Caution:** Be sure the support board does not protrude. It should not hit the paper guides as the feed table reaches its top position.

☐ d. Move the sheet separators to the 1/4 and 3/4 points (as determined by folding the sheet twice) of the gripper edge of the stock being run.

Note: Some small presses have fixed position sheet separators.

☐ e. Place stock to be run on the feed table support board.

☐ f. Raise feed table so top of pile is near the top feed position.

☐ g. Position the feeder side guides to touch the paper pile.

Note: Make sure the sheets are square against the front guides.

☐ h. Place back paper guide to hold sheets in position against front guides.

Note: The back guide must not bind the sheets.

☐ i. Move sucker tube(s) to a position in line with the sheet separators.

Note: Some small presses have fixed position sucker tube sockets so the sucker tubes may be moved to alternate positions.

☐ j. Slide pullout rollers to position near sucker tubes.

☐ k. Set stack height for weight of stock being fed.

1) Turn press on.

2) Allow stack to feed at pre-set height.

3) Turn press off.

4) Turn handwheel until sucker tubes are in the down position.

5) Observe the distance from the bottom of the sucker tube to the top of the stack.

- 1/8″ space is recommended for lightweight stocks (16 pound or 20 pound bond or lighter).
- 1/16″ space is recommended for heavier weight paper.
- Touch is recommended for heavier card and cover stock.

6) Adjust stack height regulator to change distance between sucker tube and stack if needed.

7) Lower paper pile slightly by using hand crank if stack height regulator setting is changed.

8) Repeat steps **k1** through **k6** until desired setting is obtained.

☐ l. Adjust the air blast to separate the top six or eight sheets when the sucker tubes are in the up and forward position and the stack is at top position.

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☐ m. Adjust the vacuum to pick up only one sheet.

Note: A final setting of vacuum cannot be completed until the press is set up for register and delivery and sheets are fed continuously.

☐ n. Adjust double sheet detector.

Note: Small presses which feed directly into the cylinder grippers from the feed table do not normally have a double sheet detector.

1) Fold a narrow strip of the stock to be fed so that one end protrudes about an inch.

2) Slide that folded strip under the detector and adjust for the passing of one sheet and the stopping or deflecting of two or more sheets.

☐ o. Check pullout roller pressure.

1) Insert a sheet of stock to be run between the pullout rollers.

2) Pull the sheet from between the rollers by hand.

Note: A steady resistance should be noted as the paper slides from between the rollers.

☐ 3. Set up the register system.

Note: Some small presses do not have a register board; registration is controlled by the sheet position on the feed table and the amount of sheet buckle as the paper is fed directly into the cylinder grippers.

☐ a. Turn handwheel until the jogger guide moves to its inward position.

☐ b. Move jogger guide to the desired final sheet position.

☐ c. Place a sheet of paper from stock to be run on the register board against the jogger side guide and front paper stops.

☐ d. Position the movable, fixed position side guide to hold sheet in place.

☐ e. Move conveyor tapes to carry the sheet flat and for best travel of the paper.

☐ f. Place paper hold down strips over conveyor tapes close to outer edges of sheets and side guides.

- ☐ g. Set paper control wheels or balls to aid in movement, positioning and retaining of the sheet for movement into the cylinder grippers.

  Note: Running one or more wheels just off the trailing edge of the sheet at the paper stop position will prevent any bounce and will help hold each sheet in exact position.

- ☐ h. Adjust feed roller pressure if thickness of stock varies from previously run sheet.

  Note: Check with instructor, then see operator's manual for specific press being set up.

☐ 4. Set up the delivery system.

- ☐ a. Tray delivery

  1) Position the receiving tray guides so sheet will be jogged as it is received and held in a straight stack.

  2) Position ejector rollers to run close to the side edges of the sheet if possible.

     Note: If ejector rollers must pass through an image area for proper sheet delivery they must be coated (dampened) continuously to prevent streaking; check with instructor.

  3) Move ejector rings to control any troublesome curl in the delivered sheets.

     Note: To prevent paper jams, sheets must be removed frequently after press run begins; most receiving trays will hold a ream of 500 sheets of lightweight paper, i.e., up to 20 pound bond.

  4) Move the paper bail to aid in receiving and stacking the delivered sheets.

- ☐ b. Chute delivery with receding stacker

  1) Position receiving table guides so sheet will be jogged as it is received and held in a straight stack.

  2) Set the ejector rollers to run as close to the side edges of the sheet as possible.

     Note: If ejector rollers must pass through an image area for proper sheet delivery they must be coated or dampened continuously to prevent streaking; check with instructor.

3) Move ejector rings to control any troublesome curl in the delivered sheets.

4) Raise delivery table to highest point.

5) Allow 100–150 sheets to be delivered before engaging the stacker lowering mechanism.

Note: Large quantities of stock may be stacked before stock must be removed from the delivery table; to prevent ink from the image on the front of the stacked sheets from setting off onto the backs of the sheets, stock should be removed in whatever quantities are necessary.

☐ c. Chain delivery

1) Position paper turning guides or wheels for width of stock.

Note: Sometimes the turning guides will streak a heavily inked image area, so they should be positioned accordingly.

2) Raise the delivery table to the highest point.

3) Move paper guides and joggers to straighten and hold the delivered sheets.

4) Allow 100–150 sheets to be delivered before engaging the delivery table lowering device.

Note: Since large quantities of stock may be stacked before stock must be removed from delivery table, notice should be taken to prevent ink from the image on the front of the stacked sheets from setting off onto the backs of the sheets; stock should be removed in whatever quantities are necessary.

☐ 5. Return tools and materials to proper storage.

Evaluator's Comments: ______________________________

____

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Objective 9

Job Sheet 2—Set Up the Image Control Systems

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Inking system set up according to instructions	______
• Dampening system set up according to instructions	______
• Cylinder system set up according to instructions	______

Basic Skills

Reading · Critical Thinking · Employability · Technology

Introduction

Before a successful press run can be accomplished, the press operator must set the press' inking and dampening system to produce the desired results. This exercise will give the student experience in these adjustments as well as in the adjustments necessary for efficient, in-register impressions by the cylinder system.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Ink (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plate
- Shop towel (rags)
- Operator's manual for specific press being set up

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up inking system.

  ☐ a. Replace rollers which have been removed from press.

  ☐ b. Turn off all night latches.

  ☐ c. Turn off ink form rollers.

- ☐ d. Add limited quantity of ink to ink fountain.

  Note: The type of ink used will be determined by the type of equipment, the type of water system, the type of stock, and other requirements; see job order or talk to the instructor.

- ☐ e. Contact ink ductor roller to ink fountain roller.
- ☐ f. Rotate ink fountain roller while adjusting the ink fountain screws until an even flow of ink is obtained between the ink fountain and ductor rollers.
- ☐ g. Place single lever control in appropriate position.

  Note: The single lever control is usually in the “off” or “neutral” position during the inking procedure.

- ☐ h. Turn on press.
- ☐ i. Turn on ink feed.
- ☐ j. Run ink to system until an even velvety appearance shows on all ink rollers.
- ☐ k. Turn off ink feed.

  Note: After initial inking, the quantity of ink fed to the system will depend on that required to cover the image area of the plate.

- ☐ l. Turn off press.

☐ 3. Set up dampening system.

- ☐ a. Replace rollers which have been removed from press.
- ☐ b. Mix fountain solution.

  Note: Basic dampening chemistry is covered in Unit 2. See instructor for specific usage.

- ☐ c. Add fountain solution to water fountain.

  Note: On small presses with integrated ink and water systems, only the water feed setting needs to be made after water is put in the fountain.

- ☐ d. Contact water ductor roller to water fountain roller.

  - ☐ e. Rotate water fountain roller until ductor roller is soaked with fountain solution.
  - ☐ f. Turn on press.
  - ☐ g. Turn on water feed.
  - ☐ h. Run press until water form roller cover is damp.

    Note: Water form roller cover should not be wet enough to squeeze visible moisture from its surface.

  - ☐ i. Refer to instruction manual or instructor for initial dampening procedure for "bare back" water rollers.

- ☐ 4. Set up the cylinder system.
  - ☐ a. Clean plate cylinder surface if needed.

    Note: On presses where the plate does not cover the full cylinder surface, the surface should be kept water-receptive by cleaning and applying plate etch.

  - ☐ b. Move plate cylinder head clamp to a square, centered position.
  - ☐ c. Clean impression cylinder surface if needed.

    Note: The impression cylinder surface should be kept as ink-repellent as possible.

  - ☐ d. Clean blanket surface with blanket wash.
  - ☐ e. Wipe blanket surface dry.
  - ☐ f. Attach plate to plate cylinder.

    Note: Plate must be clean and coated with preservative.

    1) Place gripper edge of plate in head clamp or on its pins.

    2) Rotate press by hand as plate is pulled around cylinder to attach tail clamp.

       Note: Plate should fit parallel to edge of plate cylinder and be held taut around cylinder surface.

  - ☐ g. Clean impression cylinder surface if needed.

☐ 5. Return tools and materials to proper storage.

Evaluator's Comments: ________________________________

____

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Objective 10

Job Sheet 3—Operate an Offset Press From Setup of Systems Through Printed Sheet Delivery

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Control systems accurately set up for job	______
• Makeready completed satisfactorily	______
• Press run completed with adequately maintained image position and quality	______

Basic Skills

Reading · Critical Thinking · Employability · Technology

Introduction

This exercise will give the student experience in press operations from start to finish, producing a satisfactorily printed piece of work.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Note: The application of this job sheet may be made to include the following variations to afford student experience with: 1. different types of plates: paper, electrostatic, photodirect, and metal; 2. varying types of stock: onionskin, bond, coated book, uncoated book, text, index, cover, card, carbonless, gum label, adhesive backed label, envelopes, and others; 3. different sizes of stock from minimum to maximum for a specific press; 4. printing one, two, three, or four colors of ink; 5. variety of ink coverage requirements: uniform, light, heavy, varying, halftones, or solids; 6. different image position requirements: loose register, tight register, print front and back, work-and-turn, work-and-tumble; and others the instructor may include.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Paper stock (size specified by instructor)
- Ink (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plate
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Job Sheet 3

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up sheet control systems for appropriate stock. (See Job Sheet 1.)

☐ 3. Set up image control systems. (See Job Sheet 2.)

☐ 4. Position image on sheet being run to job specifications and set cylinder pressures.

Note: This procedure is called "makeready."

  ☐ a. Premoisten plate.

  ☐ b. Turn on press.

  ☐ c. Turn on water form roller.

  ☐ d. Turn on ink form rollers.

  ☐ e. Make image impression from plate to blanket.

  Note: Contact for three or four revolutions is usually enough.

  ☐ f. Turn on air and vacuum.

  ☐ g. Turn on feed lever.

  Note: Some small presses start feeding paper when vacuum is turned on.

  ☐ h. Allow two sheets to feed.

  ☐ i. Turn off feed lever.

  Note: Some small presses stop feeding only when vacuum is turned off.

  ☐ j. Turn off air and vacuum.

  ☐ k. Turn off ink form rollers.

  ☐ l. Turn off water form roller.

  Note: On small presses with integrated ink and water systems there is no separate water form roller.

  ☐ m. Turn off press.

☐ n. Check position of image.

  1) For squareness

  2) Vertically (relative to gripper edge of sheet)

  3) Horizontally (relative to side guide edge of sheet)

☐ o. Change image position as required.

  1) Squareness

    - Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.

    - For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

  2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control knob.

  3) Horizontal—Move paper on feed table and/or register board side to side.

☐ p. Clean and dry blanket.

☐ q. Repeat steps **4n** through **4p** until image is in position as specified by job order.

☐ 5. Evaluate image quality for proper impression settings.

Note: Observe image on blanket first. Image should be sharp with good ink coverage.

☐ a. Plate to blanket

☐ b. Blanket to paper

Note: If the thickness of the plate being used is different from the previous plate, then plate to blanket pressure setting must be changed. If a lighter or heavier stock is being fed than the previous sheet, then the pressure setting from blanket to impression cylinder will need to be changed.

☐ 6. Change cylinder pressures as required.

  ☐ a. Plate to blanket (See operator's manual.)

  ☐ b. Blanket to impression cylinder (See operator's manual.)

☐ 7. Complete press run.

  ☐ a. Set sheet counter to 0.

  ☐ b. Repeat steps **4a** through **4g** to begin run.

  ☐ c. Turn on ink feed.

  ☐ d. Reset ink fountain for ink flow to meet image requirements as press run progresses and maintain ink supply in fountain.

  ☐ e. Remove paper from receiving tray or stacker as required.

  Note: Because of the condition of set off or delivery difficulties, some stocks must be removed more frequently in smaller quantities.

  ☐ f. Maintain fountain solution level in fountain and monitor distribution to plate.

  ☐ g. Remove a printed sheet from the delivery system periodically for inspection.

  Note: **Do not** stop press.

  ☐ h. Make necessary adjustments to maintain image position and quality, and to control paper feed and delivery throughout the press run.

  ☐ i. Follow steps **4i** through **4m** at the end of the press run.

  ☐ j. Remove last of printed sheets from delivery system.

  ☐ k. Remove plate.

  ☐ l. Clean plate (front and back).

  ☐ m. Prepare plate for storage by applying gum to image side(s).

  ☐ n. Clean plate cylinder and coat with plate etch.

  - ☐ o. Clean and dry blanket.
  - ☐ p. Clean impression cylinder.
- ☐ 8. Return tools and materials to proper storage.

Evaluator's Comments: ______________________________

____

____

Objective 11

Job Sheet 4—Rule Up a Sheet

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Press sheet squared up	_____
• Lines properly drawn at crop and fold marks	_____
• Rule out size is proper finished size	_____

Basic Skills

Reading Mathematics

Introduction

This exercise will familiarize the student with the practice of ruling up a sheet to ensure that the size and bleed amounts on the press sheet coincide with the job finishing instructions located on the job ticket.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Light table
- Black pen
- Printed press sheet and job ticket (provided by instructor)
- Tape
- T-square
- Ruler

Procedure

☐ 1. Obtain job ticket and printed press sheet from instructor.

☐ 2. Position printed press sheet with gripper margin toward top of light table.

☐ 3. Square press sheet up on the surface of the light table using your T-square.

☐ 4. Hold press sheet securely and tape it into position with two pieces of tape on both the right and left hand sides making sure that it is square to gripper edge.

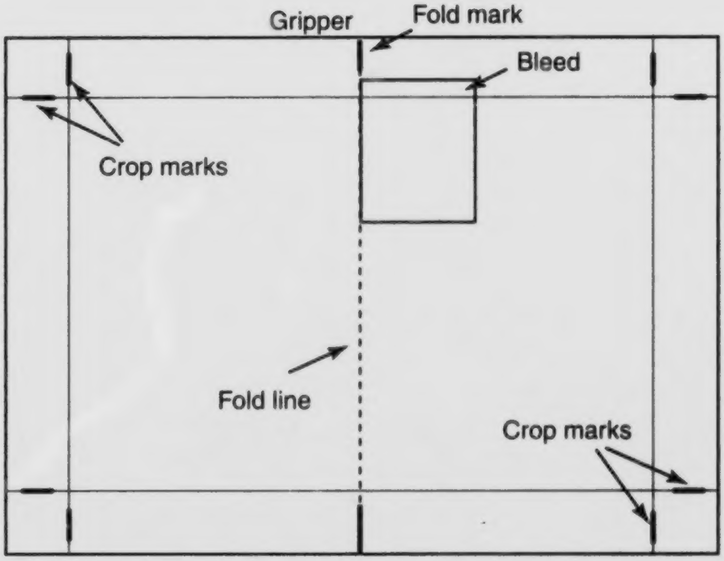
☐ 5. Check to ensure that all copy is square to the press sheet.

☐ 6. Using a T-square, draw horizontal and vertical lines connecting crop marks to create image area for finished sheet size (Figure 1).

Note: The number of crop and fold marks may vary depending on the style of the piece and the number of pieces being printed on the press sheet.

☐ 7. Using a T-square, draw a dotted line at the fold mark(s) (Figure 1).

Figure 1



☐ 8. Using a ruler, check to ensure that final trim size and folds are correct. The trim size can be obtained from the job ticket.

☐ 9. Using a ruler, check to ensure that the margins are correct.

☐ 10. Have your instructor evaluate your ruled up sheet.

☐ 11. Clean work area and return equipment and materials to proper storage.

Evaluator's Comments: ______________________________

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Objective 12

Job Sheet 5—Perform a Color Wash on an Offset Press

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Water and ink systems properly cleaned	______
• Rollers properly cleaned on an off press	______
• Light ink run so no traces of dark ink remain	______
• Press cleaned and reassembled properly	______

Basic Skills

Reading Critical Thinking Employability Technology

Introduction

Quality press work involves a thorough clean-up at the end of each press run. This exercise will give the student experience in cleaning an offset press properly so as to avoid stains and improper colors on the next run.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Standard tools for specific press being washed
- Blanket wash
- Cleanup mats or wash up attachment
- Shop towels (rags)
- Ink knife
- Cotton pads
- Plate cleaner
- Plate etch

Procedure

Note: Ink and water rollers in integrated systems will clean up together with cleanup mat or washup attachment, bare back water rollers must be cleaned separately from ink rollers.

☐ 1. Check with instructor before beginning this job sheet.

Note: If press has been left in night latch position, night latches must be turned off.

☐ 2. Clean water system first.

  ☐ a. Remove fountain bottle.

- ☐ b. Drain water from fountain.
- ☐ c. Remove covered water form roller.

☐ 3. Remove ink from ink fountain.

- ☐ a. Use ink knife, being careful not to scratch ink fountain roller.
- ☐ b. Use two 2-inch (approximate) strips the width of the ink fountain blade cut from used cleanup mats or other card stock.
    1) Slide one cardboard strip against the fountain blade under the ink until it touches the fountain roller.
    2) Slide the second cardboard strip against the fountain roller surface through the ink until it touches the first cardboard strip.
    3) Lightly squeeze the two cardboard strips together and lift the ink out of the fountain.

    Note: Lift the ink out slowly while folding the edges of the card strips toward each other to prevent dripping ink on press or floor.
- ☐ c. Discard ink by carefully folding it inside several sheets of old stock.

☐ 4. Clean ink fountain unit.

- ☐ a. By removing from press
    1) Remove fountain from press.
    2) Clean ink fountain with blanket wash.
    3) Clean ink fountain roller and ink ductor roller.
        - Rotate the press by turning handwheel to contact ink fountain and ductor rollers.
        - Turn rollers together and clean with blanket wash.
        - Remove ductor roller.
        - Clean ends of both rollers.

- ☐ b. By leaving on press
    1) Place cotton pads soaked with blanket wash on fountain blade against fountain roller.
    2) Turn on ink feed to highest setting.
    3) Finish press wash up procedure through **step 16**.
    4) Remove ink fountain.
    5) Clean ink fountain.
    6) Clean ends of ink fountain roller and ductor roller.
    7) Proceed with press wash-up procedures (**steps 17—25**).

☐ 5. Attach cleanup mat.

- ☐ a. Insert one end of mat in the head clamp like an offset plate.
- ☐ b. Attach tail clamp.
- ☐ c. Do not tighten tail clamp screws.

Note: If a wash-up attachment is used for cleaning the rollers, the procedure will depend on the type of attachment; check with the operator's manual or the instructor.

☐ 6. Turn on press.

☐ 7. Slow the press to slowest speed.

☐ 8. Check on/off position of ink form rollers.

- ☐ a. With single lever control, form rollers should be in the "on" position and lever in "neutral" or "off" position.
- ☐ b. Without single lever control, form rollers should be in the "off" position.

☐ 9. Apply small quantity of blanket wash to the top ink rollers.

☐ 10. Place ink form rollers against cleanup mat.

- ☐ a. With single lever, move lever to ink position.
- ☐ b. Without single lever, move form roller knobs to "on" position.

☐ 11. Add blanket wash in small quantity as ink and blanket wash are absorbed by cleanup mat.

☐ 12. Repeat **step 11** until cleanup mat is near saturation.

☐ 13. Move ink form rollers from against cleanup mat.

  ☐ a. With single lever, move lever to "off" or "neutral" position.

  ☐ b. Without single lever, move form roller knobs to "off" position.

  Note: Form rollers should not be turned off until sufficient blanket wash is absorbed from rollers to prevent dripping when press is stopped.

☐ 14. Turn off press.

☐ 15. Remove cleanup mat.

Note: Cleanup mats may be used once on each side but must be allowed to dry in between.

☐ 16. Repeat **steps 5 through 15** until ink rollers appear clean.

Note: If a dark ink has just been run and the next job calls for a light ink, it may be necessary to charge the ink fountain with a small quantity of the light ink to be run and ink up the press just as if the job were to be printed at this time. This will allow solvents in the light ink to react with any traces of the previous dark ink and bring them to the printing surface to be cleaned as per steps 5 through 15. This seemingly wasteful practice can save a press operator the embarrassment of the light ink "changing colors" during a run as the dark ink comes to the surface during the heat and agitation of printing. Once the light ink has been run, the press can again be cleaned as per steps 5 through 15, and by removing any ink rollers from the press and manually washing them with clean rags and solvent.

☐ 17. Clean ends of all rollers.

☐ 18. Wipe all rollers with blanket wash, then dry.

Note: Sometimes rollers need to be removed from the press for proper wiping.

☐ 19. Clean plate cylinder with water base cleaner, then apply film of plate etch.

☐ 20. Clean blanket with blanket wash, then dry.

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☐ 21. Clean impression cylinder with water base cleaner, then apply film of plate etch.

☐ 22. Replace all rollers which have been removed from press.

☐ 23. Replace ink fountain.

☐ 24. Set press in night latch position.

  ☐ a. Place all controls in "off" position.

  ☐ b. Separate roller surfaces.

☐ 25. Clean ink from side frames, side covers, control levers and knobs, and floor around and under press.

☐ 26. Return tools and materials to proper storage.

Evaluator's Comments: ______________________________

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Objective 13

Job Sheet 6—Print Envelopes

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

Evaluation Criteria	Rating
• Control systems accurately set up for the job	______
• Feed table and cylinder pressure adjusted to accommodate envelopes	______
• Press run completed with adequately maintained image position and quality	______

Basic Skills

Reading   Critical Thinking   Employability   Technology

Introduction

This exercise gives the student experience in a very common printing project: envelopes.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Envelope stock (specified by instructor)
- Ink (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plate
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up sheet control systems for envelope stock. (See Job Sheet 1.)

☐ 3. Set up image control systems. (See Job Sheet 2.)

☐ 4. Position image on sheet being run to job specifications and set cylinder pressure to accommodate extra thickness of envelope stock.

☐ 5. Adjust delivery system for length of stock.

Note: This procedure is called "makeready."

- ☐ 6. Begin printing.
  - ☐ a. Premoisten plate.
  - ☐ b. Turn on press.
  - ☐ c. Turn on water form roller.
  - ☐ d. Turn on ink form rollers.
  - ☐ e. Make image impression from plate to blanket.

    Note: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.
  - ☐ f. Turn on air and vacuum.
  - ☐ g. Turn on feed lever.

    Note: Some small presses begin feeding when vacuum is turned on.
  - ☐ h. Allow several sheets to be printed.
  - ☐ i. Turn off feed lever.
  - ☐ j. Adjust air and vacuum to accommodate envelope stock.
  - ☐ k. Adjust double sheet detector to accommodate envelope stock.

    Note: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.
  - ☐ l. Turn off air and vacuum.
  - ☐ m. Turn off ink form rollers.
  - ☐ n. Turn off water form roller.

    Note: On small presses with integrated ink and water systems, there is no separate water form roller.
  - ☐ o. Turn off press.

- ☐ p. Check image.
    1) For squareness
    2) Vertically (relative to gripper edge of stock)
    3) Horizontally (relative to side guide edge of stock)
    4) Proofread image.

       Note: The press operator is the final quality control point of the printing process.
- ☐ q. Change image position as required.
    1) Squareness
        - Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.
        - For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.
    2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.
    3) Horizontal—Move paper on feed table and/or register board side to side.
- ☐ r. Clean and dry blanket.
- ☐ s. Repeat steps **6g** through **6q** until image is in position as specified by the job order.

☐ 7. Evaluate image quality for proper impression settings.

Note: Observe image on blanket first. Image should be sharp with good ink coverage.

- ☐ a. Plate to blanket
- ☐ b. Blanket to paper

☐ 8. Change cylinder pressure as required.

- ☐ a. Plate to blanket (See operator's manual.)
- ☐ b. Blanket to impression cylinder (See operator's manual.)

- ☐ 9. Complete press run.
  - ☐ a. Set sheet counter to 0.
  - ☐ b. Repeat steps **6a** through **6g** to begin run.
  - ☐ c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.
  - ☐ d. Remove paper from receiving tray or stacker as required.
  - ☐ e. Be alert to setoff and adjust spray powders accordingly.

    Note: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.
  - ☐ f. Maintain fountain solution level in fountain and monitor distribution to plate.
  - ☐ g. Remove a printed sheet from the delivery system periodically for inspection.

    Note: **Do not** stop press.
  - ☐ h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.
  - ☐ i. Repeat steps **6i** and **6l** through **6o** at the end of the press run.
  - ☐ j. Remove last of printed sheets from the delivery system.
  - ☐ k. Remove plate.
  - ☐ l. Clean plate (front and back).
  - ☐ m. Prepare plate for storage by applying gum to image side(s).
  - ☐ n. Clean plate cylinder and coat plate with etch.
  - ☐ o. Clean and dry blanket.
  - ☐ p. Clean impression cylinder.

☐ 10. Return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

Objective 14

Job Sheet 7—Change Press From Envelopes to Letterhead

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	**Rating**
• Control systems accurately set up for the job	______
• Feed table and cylinder pressure adjusted to accommodate paper stock	______
• Press run completed with adequately maintained image position and quality	______

Basic Skills

Reading   Critical Thinking   Employability   Technology

Introduction

This exercise gives the student experience in a very common printing project: shifting the press from printing envelopes to a run involving letterhead.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Note: This job sheet was developed to be accomplished immediately after Job Sheet 6 with the press set up for the previous envelope job.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Paper stock (specified by instructor)
- Ink (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plate
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Adjust feed table to accommodate stock.

☐ 3. Load stock to be run on feed table.

☐ 4. Mount plate.

- ☐ 5. Mount blanket.
- ☐ 6. Position image on sheet being run to job specifications and set cylinder pressure to accommodate different blanket from envelope job.
- ☐ 7. Adjust delivery system for length of stock.
- ☐ 8. Begin printing.
  - ☐ a. Premoisten plate.
  - ☐ b. Turn on press.
  - ☐ c. Turn on water form roller.
  - ☐ d. Turn on ink form rollers.
  - ☐ e. Make image impression from plate to blanket.

    Note: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.
  - ☐ f. Turn on air and vacuum.
  - ☐ g. Turn on feed lever.

    Note: Some small presses begin feeding when vacuum is turned on.
  - ☐ h. Allow several sheets to be printed.
  - ☐ i. Turn off feed lever.
  - ☐ j. Adjust air and vacuum to accommodate paper stock.
  - ☐ k. Adjust double sheet detector to accommodate single sheet letterhead stock.

    Note: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.
  - ☐ l. Turn off air and vacuum.
  - ☐ m. Turn off ink form rollers.

☐ n. Turn off water form roller.

Note: On small presses with integrated ink and water systems, there is no separate water form roller.

☐ o. Turn off press.

☐ p. Check image.

1) For squareness

2) Vertically (relative to gripper edge of stock)

3) Horizontally (relative to side guide edge of stock)

4) Proofread image.

Note: The press operator is the final quality control point of the printing process.

☐ q. Change image position as required.

1) Squareness

- Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.
- For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.

3) Horizontal—Move paper on feed table and/or register board side to side.

☐ r. Clean and dry blanket.

☐ s. Repeat steps **8g** through **8r** until image is in position as specified by the job order.

☐ 9. Evaluate image quality for proper impression settings.

Note: Observe image on blanket first. Image should be sharp with good ink coverage.

☐ a. Plate to blanket

☐ b. Blanket to paper

☐ 10. Change cylinder pressure as required.

  ☐ a. Plate to blanket (See operator's manual.)

  ☐ b. Blanket to impression cylinder (See operator's manual.)

☐ 11. Complete press run.

  ☐ a. Set sheet counter to 0.

  ☐ b. Repeat steps **8a** through **8g** to begin run.

  ☐ c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

  ☐ d. Remove paper from receiving tray or stacker as required.

  ☐ e. Be alert to setoff and adjust spray powders accordingly.

  Note: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.

  ☐ f. Maintain fountain solution level in fountain and monitor distribution to plate.

  ☐ g. Remove a printed sheet from the delivery system periodically for inspection.

  Note: **Do not** stop press.

  ☐ h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

  ☐ i. Repeat steps **8i** and **8l** through **8o** at the end of the press run.

  ☐ j. Remove last of printed sheets from the delivery system.

  ☐ k. Remove plate.

☐ l. Clean plate (front and back).

☐ m. Prepare plate for storage by applying gum to image side(s).

☐ n. Clean plate cylinder and coat plate with etch.

☐ o. Clean and dry blanket.

☐ p. Clean impression cylinder.

☐ 12. Return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

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Objective 15

Job Sheet 8—Print a Two-Color, Two-Sided Job

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Control systems accurately set up for the job	______
• First color press run completed with adequately maintained image position and quality	______
• Press properly cleaned and set up for second color	______
• Second color press run completed with exact register maintained	______
• Front side of sheet properly printed	______
• Back side of sheet properly printed	______

Basic Skills

Reading Critical Thinking Employability Technology

Introduction

This exercise gives the student practical experience in maintaining press cleanliness and register with a sheetwise two-color run which must be held in register.

Note: Today, many print shops are equipped with perfecting presses which print both sides of a sheet in one pass through the press. This alleviates the need to run each color and each side separately as described in this job sheet.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Note: This job sheet assumes student has accomplished Job Sheet 5, "Perform a Color Wash on an Offset Press."

Tools, equipment, and materials

- Standard tools for specific press being set up
- Coated stock (specified by instructor)
- Inks (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plates (provided by instructor)
- Offset blankets (provided by instructor)
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up sheet control systems for coated stock. (See Job Sheet 1.)

☐ 3. Set up image control systems. (See Job Sheet 2.)

☐ 4. Position image on sheet being run to job specifications.

☐ 5. Adjust delivery system for length of stock.

☐ 6. Begin printing.

  ☐ a. Premoisten plate.

  ☐ b. Turn on press.

  ☐ c. Turn on water form roller.

  ☐ d. Turn on ink form rollers.

  ☐ e. Make image impression from plate to blanket.

  Note: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.

  ☐ f. Turn on air and vacuum.

  ☐ g. Turn on feed lever.

  Note: Some small presses begin feeding when vacuum is turned on.

  ☐ h. Allow several sheets to be printed.

  ☐ i. Turn off feed lever.

  ☐ j. Adjust air and vacuum to accommodate coated stock.

  ☐ k. Adjust double sheet detector to accommodate coated stock.

  Note: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.

  ☐ l. Turn off air and vacuum.

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☐ m. Turn off ink form rollers.

☐ n. Turn off water form roller.

Note: On small presses with integrated ink and water systems, there is no separate water form roller.

☐ o. Turn off press.

☐ p. Check image.

1) For squareness

2) Vertically (relative to gripper edge of stock)

3) Horizontally (relative to side guide edge of stock)

4) Proofread image.

Note: The press operator is the final quality control point of the printing process.

☐ q. Change image position as required.

1) Squareness

- Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.

- For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.

3) Horizontal—Move paper on feed table and/or register board side to side.

☐ r. Clean and dry blanket.

☐ s. Repeat steps **6g** through **6r** until image is in position as specified by the job order.

☐ 7. Evaluate image quality for proper impression settings.

Note: Observe image on blanket first. Image should be sharp with good ink coverage. Also, use a magnifying glass to check dot structure of halftones and screen tints on printed sheet. Dots should be round. If they are oval or skewed, excessive cylinder pressure is indicated.

- ☐ a. Plate to blanket
- ☐ b. Blanket to paper

☐ 8. Change cylinder pressure as required.

- ☐ a. Plate to blanket (See operator's manual.)
- ☐ b. Blanket to impression cylinder (See operator's manual.)

☐ 9. Complete press run.

- ☐ a. Set sheet counter to 0.
- ☐ b. Repeat steps **6a** through **6g** to begin run.
- ☐ c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.
- ☐ d. Run a number of extra sheets to compensate for wastage possible in handling and second color run.

  Note: Ask your instructor what formula to use in determining overrun for this purpose.
- ☐ e. Remove paper from receiving tray or stacker as required and place on a drying rack for later use.
- ☐ f. Be alert to setoff and adjust spray powders accordingly.

  Note: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.
- ☐ g. Maintain fountain solution level in fountain and monitor distribution to plate.

- ☐ h. Remove a printed sheet from the delivery system periodically for inspection.

  Note: **Do not** stop press.
- ☐ i. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.
- ☐ j. Repeat steps **6i** and **6l** through **6o** at the end of the press run.
- ☐ k. Remove last of printed sheets from the delivery system.
- ☐ l. Remove plate.
- ☐ m. Clean plate (front and back).
- ☐ n. Prepare plate for storage by applying gum to image side(s).
- ☐ o. Clean plate cylinder and coat plate with etch.
- ☐ p. Clean and dry blanket.
- ☐ q. Clean impression cylinder.

☐ 10. Perform color wash. (See Job Sheet 5.)

☐ 11. Load ink fountain with specified second color ink.

☐ 12. Mount plate with second color image.

☐ 13. Follow steps **2** through **9** for second color run on first side.

☐ 14. Since this is a sheetwise form, both sides of the sheet will be printed. After the ink has dried, follow steps **2** through **12** for first color run on second side.

Note: Along with printing the second side, you must watch the down side of the sheet. Look for picking, scratching, or scuffing.

☐ 15. Follow steps **2** through **10** for second color run on second side.

☐ 16. Return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

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Objective 16

Job Sheet 9—Print a Two-Color Duotone Using an Additional Color Head

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Control systems accurately set up for the job	______
• Press run completed with adequately maintained image position and quality	______
• Additional color head set up for second color	______
• Press run completed with exact register maintained	______

Basic Skills

Reading Critical Thinking Employability Technology

Introduction

This exercise will give the student practical experience in printing a two-color job using a press with an additional color head, often called a T-head or swing-away.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Note: This job sheet assumes student has accomplished Job Sheet 8, "Print a Two-Color, Two-Sided Job."

Tools, equipment, and materials

- Standard tools for specific press being set up
- Standard tools for additional color head being used
- Paper stock (specified by instructor)
- Inks (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plates for a two-color duotone (provided by instructor)
- Offset blankets (provided by instructor)
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up sheet control systems for the appropriate stock. (See Job Sheet 1.)

☐ 3. Set up image control systems on the main press. (See Job Sheet 2.)

- ☐ 4. Set up image control system on the additional color head.
- ☐ 5. Position image on sheet being run to job specifications on the main press.
- ☐ 6. Position image on the additional color head for registration.
- ☐ 7. Adjust delivery system for length of stock.
- ☐ 8. Begin printing.
    - ☐ a. Premoisten plates on both press and additional color head.
    - ☐ b. Turn on press.
    - ☐ c. Turn on water form rollers on both press and additional color head.
    - ☐ d. Turn on ink form rollers on both press and additional color head.
    - ☐ e. Make image impression from plate to blanket on both systems.

      Note: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.
    - ☐ f. Turn on air and vacuum.
    - ☐ g. Turn on feed lever.

      Note: Some small presses begin feeding when vacuum is turned on.
    - ☐ h. Allow several sheets to be printed.
    - ☐ i. Turn off feed lever.
    - ☐ j. Adjust air and vacuum to accommodate stock.
    - ☐ k. Adjust double sheet detector to accommodate stock.

      Note: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.
    - ☐ l. Turn off air and vacuum.

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☐ m. Turn off ink form rollers.

☐ n. Turn off water form rollers.

Note: On small presses with integrated ink and water systems, there is no separate water form roller.

☐ o. Turn off press.

☐ p. Check image.

1) For squareness
2) Vertically (relative to gripper edge of stock)
3) Horizontally (relative to side guide edge of stock)
4) Proofread image.

Note: The press operator is the final quality control point of the printing process.

☐ q. Change image position as required.

1) Squareness
    - Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.
    - For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.
2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.
3) Horizontal—Move paper on feed table and/or register board side to side.

☐ r. Clean and dry blanket.

☐ s. Repeat steps **8g** through **8r** until image is in position as specified by the job order.

☐ 9. Evaluate image quality for proper impression settings.

Note: Observe image on blanket first. Image should be sharp with good ink coverage. Also, use a magnifying glass to check dot structure of halftones and screen tints on printed sheet. Dots should be round. If they are oval or skewed, excessive cylinder pressure is indicated.

  ☐ a. Plate to blanket

  ☐ b. Blanket to paper

☐ 10. Change cylinder pressure as required.

  ☐ a. Plate to blanket (See operator's manual.)

  ☐ b. Blanket to impression cylinder (See operator's manual.)

☐ 11. Complete press run.

  ☐ a. Set sheet counter to 0.

  ☐ b. Repeat steps **8a** through **8g** to begin run.

  ☐ c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

  ☐ d. Run a number of extra sheets to compensate for wastage possible in handling and second color run.

Note: Ask your instructor what formula to use in determining overrun for this purpose.

  ☐ e. Remove paper from receiving tray or stacker as required and place on a drying rack for later use.

  ☐ f. Be alert to setoff and adjust spray powders accordingly.

Note: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.

  ☐ g. Maintain fountain solution level in fountain and monitor distribution to plate.

☐ h. Remove a printed sheet from the delivery system periodically for inspection.

Note: **Do not** stop press.

☐ i. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

☐ j. Repeat steps **8l** and **8l** through **8o** at the end of the press run.

☐ k. Remove last of printed sheets from the delivery system.

☐ l. Remove plate.

☐ m. Clean plate (front and back).

☐ n. Prepare plate for storage by applying gum to image side(s).

☐ o. Clean plate cylinder and coat plate with etch.

☐ p. Clean and dry blanket.

☐ q. Clean impression cylinder.

☐ 12. Perform color wash on both press and additional color head. (See Job Sheet 5.)

☐ 13. Return tools and equipment to proper storage.

Evaluator's Comments: ____________________

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Objective 17

Job Sheet 10—Print a Work-and-Turn

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Control systems accurately set up for the job	______
• First press run completed with adequately maintained image position and quality	______
• Work turned from side to side and second press run completed with proper attention to quality control	______

Basic Skills

Reading Critical Thinking Employability Technology

Introduction

This exercise gives the student practical experience in manipulating the press and printing stock during the very common practice of work-and-turn.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Paper stock (specified by instructor)
- Inks (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plate (provided by instructor)
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up sheet control systems for appropriate paper stock. (See Job Sheet 1.)

☐ 3. Set up image control systems. (See Job Sheet 2.)

☐ 4. Position image on sheet being run to job specification and set cylinder pressure to accommodate stock.

☐ 5. Adjust delivery system for length of stock.

☐ 6. Begin printing job.

  ☐ a. Premoisten plate.

  ☐ b. Turn on press.

  ☐ c. Turn on water form roller. .

  ☐ d. Turn on ink form rollers.

  ☐ e. Make image impression from plate to blanket.

  Note: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.

  ☐ f. Turn on air and vacuum.

  ☐ g. Turn on feed lever.

  Note: Some small presses begin feeding when vacuum is turned on.

  ☐ h. Allow several sheets to be printed.

  ☐ i. Turn off feed lever..

  ☐ j. Adjust air and vacuum to accommodate paper stock.

  ☐ k. Adjust double sheet detector to accommodate paper stock.

  Note: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.

  ☐ l. Turn off air and vacuum.

  ☐ m. Turn off ink form rollers.

  ☐ n. Turn off water form roller.

  Note: On small presses with integrated ink and water systems, there is no separate water form roller.

  ☐ o. Turn off press.

☐ p. Check image.

  1) For squareness

  2) Vertically (relative to gripper edge of stock)

  3) Horizontally (relative to side guide edge of stock)

  4) Proofread image.

  Note: The press operator is the final quality control point of the printing process.

☐ q. Change image position as required.

  1) Squareness

    - Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.
    - For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

  2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.

  3) Horizontal—Move paper on feed table and/or register board side to side.

☐ r. Clean and dry blanket.

☐ s. Repeat steps **6g** through **6r** until image is in position as specified by the job order.

☐ 7. Evaluate image quality for proper impression settings.

Note: Observe image on blanket first. Image should be sharp with good ink coverage.

☐ a. Plate to blanket

☐ b. Blanket to paper

☐ 8. Change cylinder pressure as required.

☐ a. Plate to blanket (See operator's manual.)

☐ b. Blanket to impression cylinder (See operator's manual.)

☐ 9. Complete press run allowing for extra impressions in case of spoilage in second run.

  ☐ a. Set sheet counter to 0.

  ☐ b. Repeat steps **6a** through **6g** to begin run.

  ☐ c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

  ☐ d. Remove paper from receiving tray or stacker as required.

  ☐ e. Be alert to setoff and adjust spray powders accordingly.

  Note: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.

  ☐ f. Maintain fountain solution level in fountain and monitor distribution to plate.

  ☐ g. Remove a printed sheet from the delivery system periodically for inspection.

  Note: **Do not** stop press.

  ☐ h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

  ☐ i. Repeat steps **6i** and **6l** through **6o** at the end of the press run.

  ☐ j. Remove last of printed sheets from the delivery system.

  ☐ k. Turn printed sheets over (side to side) and place them on the feed table for second run on press.

  ☐ l. Adjust side guide on feeder table and press to accommodate second run on the back of previously printed sheets.

☐ m. Repeat steps **6a** through **6g** to make second run.

Note: Be certain to check image placement and register throughout second run.

☐ n. Repeat steps **6i** and **6l** through **6o** to end of run.

☐ o. Remove plate.

☐ p. Clean plate (front and back).

☐ q. Prepare plate for storage by applying gum to image side(s).

☐ r. Clean plate cylinder and coat plate with etch.

☐ s. Clean and dry blanket.

☐ t. Clean impression cylinder.

☐ 10. Return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

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Objective 18

Job Sheet 11—Print a Work-and-Tumble

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

Evaluation Criteria	Rating
• Control systems accurately set up for the job	______
• First press run completed with adequately maintained image position and quality	______
• Work tumbled from gripper to tail and second press run completed with proper attention to quality control	______

Basic Skills

Reading · Critical Thinking · Employability · Technology

Introduction

This exercise gives the student practical experience in manipulating the press and printing stock during the very common practice of work-and-tumble.

Note: Work-and-tumble is also referred to as work-and-roll.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Paper stock (specified by instructor)
- Inks (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plate (provided by instructor)
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up sheet control systems for appropriate paper stock. (See Job Sheet 1.)

☐ 3. Set up image control systems. (See Job Sheet 2.)

☐ 4. Position image on sheet being run to job specification and set cylinder pressure to accommodate stock.

☐ 5. Adjust delivery system for length of stock.

☐ 6. Begin printing job.

  ☐ a. Premoisten plate.

  ☐ b. Turn on press.

  ☐ c. Turn on water form roller.

  ☐ d. Turn on ink form rollers.

  ☐ e. Make image impression from plate to blanket.

  Note: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.

  ☐ f. Turn on air and vacuum.

  ☐ g. Turn on feed lever.

  Note: Some small presses begin feeding when vacuum is turned on.

  ☐ h. Allow several sheets to be printed.

  ☐ i. Turn off feed lever.

  ☐ j. Adjust air and vacuum to accommodate paper stock.

  ☐ k. Adjust double sheet detector to accommodate paper stock.

  Note: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.

  ☐ l. Turn off air and vacuum.

  ☐ m. Turn off ink form rollers.

  ☐ n. Turn off water form roller.

  Note: On small presses with integrated ink and water systems, there is no separate water form roller.

☐ o. Turn off press.

☐ p. Check image.

  1) For squareness

  2) Vertically (relative to gripper edge of stock)

  3) Horizontally (relative to side guide edge of stock)

  4) Proofread image.

  Note: The press operator is the final quality control point of the printing process.

☐ q. Change image position as required.

  1) Squareness

    - Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.

    - For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

  2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.

  3) Horizontal—Move paper on feed table and/or register board side to side.

☐ r. Clean and dry blanket.

☐ s. Repeat steps **6g** through **6r** until image is in position as specified by the job order.

☐ 7. Evaluate image quality for proper impression settings.

Note: Observe image on blanket first. Image should be sharp with good ink coverage.

☐ a. Plate to blanket

☐ b. Blanket to paper

☐ 8. Change cylinder pressure as required.

☐ a. Plate to blanket (See operator's manual.)

☐ b. Blanket to impression cylinder (See operator's manual.)

☐ 9. Complete press run allowing for extra impressions in case of spoilage in second run.

  ☐ a. Set sheet counter to 0.

  ☐ b. Repeat steps **6a** through **6g** to begin run.

  ☐ c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

  ☐ d. Remove paper from receiving tray or stacker as required.

  ☐ e. Be alert to setoff and adjust spray powders accordingly.

  Note: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.

  ☐ f. Maintain fountain solution level in fountain and monitor distribution to plate.

  ☐ g. Remove a printed sheet from the delivery system periodically for inspection.

  Note: **Do not** stop press.

  ☐ h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

  ☐ i. Repeat steps **6i** and **6l** through **6o** at the end of the press run.

  ☐ j. Remove last of printed sheets from the delivery system.

  ☐ k. Turn printed sheets over (gripper to tail) and place them on the feed table for second run on press.

  ☐ l. Adjust side guide on feeder table and press to accommodate second run on the back of previously printed sheets.

☐ m. Repeat steps **6a** through **6g** to make second run.

Note: Be certain to check image placement and register throughout second run.

☐ n. Repeat steps **6i** and **6l** through **6o** to end of run.

☐ o. Remove plate.

☐ p. Clean plate (front and back).

☐ q. Prepare plate for storage by applying gum to image side(s).

☐ r. Clean plate cylinder and coat plate with etch.

☐ s. Clean and dry blanket.

☐ t. Clean impression cylinder.

☐ 10. Return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

____

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Objective 19

Job Sheet 12—Print Halftones and Screen Tints

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Makeready properly performed for the job	____
• Cylinder pressure accurately set for quality results	____
• Press run completed so that dots of screen tints and halftones are round and displayed well-inked bright image	____

Basic Skills

Reading Critical Thinking Employability Technology

Introduction

This exercise will give the student experience in printing commonly encountered halftones and screen tints on a variety of paper stocks, a technique that requires proper cylinder adjustment.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Variety of paper stock should be used including gloss book, gloss cover, offset book, and offset cover
- Ink (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plate (provided by instructor)
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up sheet control systems for appropriate paper stock. (See Job Sheet 1.)

☐ 3. Set up image control systems. (See Job Sheet 2.)

☐ 4. Position image on sheet being run to job specifications and set cylinder pressure to accommodate stock.

Job Sheet 12

☐ 5. Adjust delivery system for length of stock.

☐ 6. Begin printing.

  ☐ a. Premoisten plate.

  ☐ b. Turn on press.

  ☐ c. Turn on water form roller.

  ☐ d. Turn on ink form rollers.

  ☐ e. Make image impression from plate to blanket.

  Note: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.

  ☐ f. Turn on air and vacuum.

  ☐ g. Turn on feed lever.

  Note: Some small presses begin feeding when vacuum is turned on.

  ☐ h. Allow several sheets to be printed.

  ☐ i. Turn off feed lever.

  ☐ j. Adjust air and vacuum to accommodate stock.

  ☐ k. Adjust double sheet detector to accommodate stock.

  Note: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.

  ☐ l. Turn off air and vacuum.

  ☐ m. Turn off ink form rollers.

  ☐ n. Turn off water form roller.

  Note: On small presses with integrated ink and water systems, there is no separate water form roller.

  ☐ o. Turn off press.

☐ p. Check image.

1) For squareness
2) Vertically (relative to gripper edge of stock)
3) Horizontally (relative to side guide edge of stock)
4) Proofread image.

Note: The press operator is the final quality control point of the printing process.

☐ q. Change image position as required.

1) Squareness
    - Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.
    - For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.
2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.
3) Horizontal—Move paper on feed table and/or register board side to side.

☐ r. Clean and dry blanket.

☐ s. Repeat steps **6g** through **6r** until image is in position as specified by the job order.

☐ 7. Evaluate image quality for proper impression settings.

Note: Use a magnifying glass to check dot structure of halftones and screen tints on printed sheet. Dots should be round. If they are oval or otherwise skewed, cylinder pressure is too great. Also, be certain enough ink is being transferred for a bright image and full coverage in the dot pattern. At this point, some printers compare a printed sheet with the original negative on a light table to evaluate their printing quality.

☐ a. Plate to blanket

☐ b. Blanket to paper

☐ 8. Change cylinder pressure as required.

Note: This step is critical to halftone and screen tint printing.

  ☐ a. Plate to blanket (See operator's manual.)

  ☐ b. Blanket to impression cylinder (See operator's manual.)

☐ 9. Complete press run.

  ☐ a. Set sheet counter to 0.

  ☐ b. Repeat steps **6a** through **6g** to begin run.

  ☐ c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

  ☐ d. Remove paper from receiving tray or stacker as required.

  Note: Watch delivery stack and monitor printed sheets to be certain just-printed sheets are not smearing the dot structure of sheets already in the delivery pile.

  ☐ e. Be alert to setoff and adjust spray powders accordingly.

  Note: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.

  ☐ f. Maintain fountain solution level in fountain and monitor distribution to plate.

  ☐ g. Remove a printed sheet from the delivery system periodically for inspection.

  Note: **Do not** stop press.

  ☐ h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

  ☐ i. Repeat steps **6l** and **6l** through **6o** at the end of the press run.

- ☐ j. Remove last of printed sheets from the delivery system.
- ☐ k. Remove plate.
- ☐ l. Clean plate (front and back).
- ☐ m. Prepare plate for storage by applying gum to image side(s).
- ☐ n. Clean plate cylinder and coat plate with etch.
- ☐ o. Clean and dry blanket.
- ☐ p. Clean impression cylinder.

☐ 10. Return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

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Objective 20

Job Sheet 13—Print Solids

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Makeready properly performed with delivery system adjusted for heavy inking	______
• Press run completed with care so inking and delivery problems were avoided or corrected	______

Basic Skills

Reading Critical Thinking Employability Technology

Introduction

This exercise will give the student experience in printing solids which require care in adjustment because of heavy inking required to produce satisfactory results on gloss cover and offset cover.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Gloss cover and offset cover
- Ink (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plate (provided by instructor)
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up sheet control systems for appropriate stock. (See Job Sheet 1.)

☐ 3. Set up image control systems. (See Job Sheet 2.)

☐ 4. Position image on sheet being run to job specifications and set cylinder pressure to accommodate stock.

☐ 5. Adjust delivery system for length of stock and potential curling of heavily-inked stock.

Note: Chain delivery is almost essential for printing solids on duplicator type presses. Without chain delivery to pull stock and tacky coating of ink away from the cylinder, ring or wheel extractors are hard pressed to perform the job.

☐ 6. Begin printing.

- ☐ a. Premoisten plate.
- ☐ b. Turn on press.
- ☐ c. Turn on water form roller.
- ☐ d. Turn on ink form rollers.
- ☐ e. Make image impression from plate to blanket.

  Note: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.

- ☐ f. Turn on air and vacuum.
- ☐ g. Turn on feed lever.

  Note: Some small presses begin feeding when vacuum is turned on.

- ☐ h. Allow several sheets to be printed.
- ☐ i. Turn off feed lever.
- ☐ j. Adjust air and vacuum to accommodate stock.
- ☐ k. Adjust double sheet detector to accommodate stock.

  Note: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.

- ☐ l. Turn off air and vacuum.
- ☐ m. Turn off ink form rollers.

☐ n. Turn off water form roller.

Note: On small presses with integrated ink and water systems, there is no separate water form roller.

☐ o. Turn off press.

☐ p. Check image.

1) For squareness

2) Vertically (relative to gripper edge of stock)

3) Horizontally (relative to side guide edge of stock)

4) Proofread image.

Note: The press operator is the final quality control point of the printing process.

☐ q. Change image position as required.

1) Squareness

- Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.
- For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.

3) Horizontal—Move paper on feed table and/or register board side to side.

☐ r. Clean and dry blanket.

☐ s. Repeat steps **6g** through **6r** until image is in position as specified by the job order.

☐ 7. Evaluate image quality for proper impression settings.

Note: Check for full, even coverage in the solids, watching for any signs of streaking or problems in the delivery system.

☐ a. Plate to blanket

☐ b. Blanket to paper

☐ 8. Change cylinder pressure as required.

  ☐ a. Plate to blanket (See operator's manual.)

  ☐ b. Blanket to impression cylinder (See operator's manual.)

☐ 9. Adjust ink feed as necessary to produce specified results in solids.

Note: Many times a printing job requiring solids also will require the addition of reducers, anti-piling agents, anti-static agents and driers to the ink fountain. Check with your instructor concerning the need for these preparations.

☐ 10. Complete press run.

  ☐ a. Set sheet counter to 0.

  ☐ b. Repeat steps **6a** through **6g** to begin run.

  ☐ c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

  ☐ d. Remove paper from receiving tray or stacker as required.

  Note: With heavy coat of tacky ink necessary in printing solids, the operator must keep close watch on delivered sheets to correct problems as they develop.

  ☐ e. Be alert to setoff and adjust spray powders accordingly.

  Note: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Excessive spray powders used in a job with solid ink coverage can show up as white spots and piling on the finished sheet. Because of the amount of ink used in solids and delivery difficulties, stock should be removed frequently in small lifts and spread out in a well-ventilated drying area.

  ☐ f. Maintain fountain solution level in fountain and monitor distribution to plate.

  ☐ g. Remove a printed sheet from the delivery system periodically for inspection.

  Note: **Do not** stop press.

☐ h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

☐ i. Repeat steps **6l** and **6l** through **6o** at the end of the press run.

☐ j. Remove last of printed sheets from the delivery system.

☐ k. Remove plate.

☐ l. Clean plate (front and back).

☐ m. Prepare plate for storage by applying gum to image side(s).

☐ n. Clean plate cylinder and coat plate with etch.

☐ o. Clean and dry blanket.

☐ p. Clean impression cylinder.

☐ 11. Return tools and equipment to proper storage.

Evaluator's Comments: ____________________

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Objective 21

Job Sheet 14—Print Using Photodirect and/or Electrostatic Masters

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Control systems accurately set up for job	______
• Makeready completed satisfactorily	______
• Press run completed with adequately maintained image position and quality	______

Basic Skills

Reading Critical Thinking Employability Technology

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Paper stock (size specified by instructor)
- Ink (specified by instructor)
- Fountain solution (specified by instructor)
- Photodirect or electrostatic plate
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up sheet control systems. (See Job Sheet 1.)

☐ 3. Set up image control systems. (See Job Sheet 2.)

Note: Extra care must be given when utilizing electrostatic or photodirect masters. The polyester or paper base is much more sensitive than aluminum and must be kept damp at all times.

☐ 4. Position image on sheet being run to job specifications and set cylinder pressures.

Note: This procedure is called "makeready."

- ☐ a. Premoisten plate.
- ☐ b. Turn on press.
- ☐ c. Turn on water form roller.
- ☐ d. Turn on ink form rollers.
- ☐ e. Make image impression from plate to blanket.

  Note: Contact for three or four revolutions is usually enough.
- ☐ f. Turn on air and vacuum.
- ☐ g. Turn on feed lever.

  Note: Some small presses start feeding paper when vacuum is turned on.
- ☐ h. Allow two sheets to feed.
- ☐ i. Turn off feed lever.

  Note: Some small presses stop feeding only when vacuum is turned off.
- ☐ j. Turn off air and vacuum.
- ☐ k. Turn off ink form rollers.
- ☐ l. Turn off water form roller.

  Note: On small presses with integrated ink and water systems there is no separate water form roller.
- ☐ m. Turn off press.
- ☐ n. Check position of image.
  1) For squareness
  2) Vertically (relative to gripper edge of sheet)
  3) Horizontally (relative to side guide edge of sheet)

- ☐ o. Change image position as required.
    - 1) Squareness
        - Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.
        - For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.
    - 2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control knob.
    - 3) Horizontal—Move paper on feed table and/or register board side to side.
- ☐ p. Clean and dry blanket.
- ☐ q. Repeat steps **4n** through **4p** until image is in position as specified by job order.

☐ 5. Evaluate image quality for proper impression settings.

Note: Observe image on blanket first. Image should be sharp with good ink coverage.

- ☐ a. Plate to blanket
- ☐ b. Blanket to paper

    Note: If the thickness of the plate being used is different from the previous plate, then plate to blanket pressure setting must be changed. If a lighter or heavier stock is being fed than the previous sheet, then the pressure setting from blanket to impression cylinder will need to be changed.

☐ 6. Change cylinder pressures as required.

- ☐ a. Plate to blanket (See operator's manual.)
- ☐ b. Blanket to impression cylinder (See operator's manual.)

☐ 7. Complete press run.

- ☐ a. Set sheet counter to 0.
- ☐ b. Repeat steps **4a** through **4g** to begin run.

☐ c. Turn on ink feed.

☐ d. Reset ink fountain for ink flow to meet image requirements as press run progresses and maintain ink supply in fountain.

☐ e. Remove paper from receiving tray or stacker as required.

Note: Because of the condition of set off or delivery difficulties, some stocks must be removed more frequently in smaller quantities.

☐ f. Maintain fountain solution level in fountain and monitor distribution to plate.

☐ g. Remove a printed sheet from the delivery system periodically for inspection.

Note: **Do not** stop press.

☐ h. Make necessary adjustments to maintain image position and quality, and to control paper feed and delivery throughout the press run.

☐ i. Follow steps **4l** through **4m** at the end of the press run.

☐ j. Remove last of printed sheets from delivery system.

☐ k. Remove plate and dispose of it according to shop guidelines.

☐ l. Clean plate cylinder and coat with plate etch.

☐ m. Clean and dry blanket.

☐ n. Clean impression cylinder.

☐ 8. Return tools and materials to proper storage.

Evaluator's Comments: ______________________________

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Objective 22

Job Sheet 15—Print a Four-Color Process Job

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Control systems accurately set up for the job	______
• All press runs completed with adequately maintained color density and register	______
• Press properly washed up from each press run	______

Basic Skills

Reading Critical Thinking Employability Technology

Introduction

This exercise gives the student practical experience in printing four-color process work.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Note: There are many schools of thought on how to run a four-color process job on a small single color press. Many press operators prefer to run the yellow first, however this is not recommended because the yellow can prevent the press operator from seeing holes or smashes in the blanket. Therefore, in this job sheet the student will print the four colors in the following order: magenta, cyan, yellow, and black. Printing the four colors in this order allows the press operator to see the magenta better since it is printed alone rather than with yellow. Printing the cyan second ensures good trapping for the magenta and cyan combinations. The yellow will be laid down third to gain good skintone combination. The black will always be laid down last in order for the press operator to maintain better control of the highlights and shadow areas.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Coated and uncoated stock
- Inks (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plates (provided by instructor)
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Job Sheet 15

Procedure

- ☐ 1. Check with instructor before beginning this job sheet.
- ☐ 2. Set up sheet control systems for appropriate stock. (See Job Sheet 1.)
- ☐ 3. Set up image control systems. (See Job Sheet 2.)
- ☐ 4. Position image on sheet being run to job specification and set cylinder pressure to accommodate stock.
- ☐ 5. Adjust delivery system for length of stock.
- ☐ 6. Begin printing job.
  - ☐ a. Premoisten plate.
  - ☐ b. Turn on press.
  - ☐ c. Turn on water form roller.
  - ☐ d. Turn on ink form rollers.
  - ☐ e. Make image impression from plate to blanket.

    Note: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.
  - ☐ f. Turn on air and vacuum.
  - ☐ g. Turn on feed lever.

    Note: Some small presses begin feeding when vacuum is turned on.
  - ☐ h. Allow several sheets to be printed.
  - ☐ i. Turn off feed lever.
  - ☐ j. Adjust air and vacuum to accommodate paper stock.
  - ☐ k. Adjust double sheet detector to accommodate paper stock.

    Note: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.
  - ☐ l. Turn off air and vacuum.
  - ☐ m. Turn off ink form rollers.

- ☐ n. Turn off water form roller.

  Note: On small presses with integrated ink and water systems, there is no separate water form roller.

- ☐ o. Turn off press.
- ☐ p. Check image.
  1) For squareness
  2) Vertically (relative to gripper edge of stock)
  3) Horizontally (relative to side guide edge of stock)
  4) Proofread image.

     Note: The press operator is the final quality control point of the printing process.

- ☐ q. Change image position as required.
  1) Squareness
     - Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.
     - For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.
  2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.
  3) Horizontal—Move paper on feed table and/or register board side to side.
- ☐ r. Clean and dry blanket.
- ☐ s. Repeat steps **6g** through **6r** until image is in position as specified by the job order.

☐ 7. Evaluate image quality for proper impression settings.

Note: Observe image on blanket first. Image should be sharp with good ink coverage.

- ☐ a. Plate to blanket
- ☐ b. Blanket to paper

☐ 8. Change cylinder pressure as required.

  ☐ a. Plate to blanket (See operator's manual.)

  ☐ b. Blanket to impression cylinder (See operator's manual.)

☐ 9. Complete press run allowing for extra impressions in case of spoilage in second run.

  ☐ a. Set sheet counter to 0.

  ☐ b. Repeat steps **6a** through **6g** to begin run.

  ☐ c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

  ☐ d. Remove paper from receiving tray or stacker as required.

  ☐ e. Be alert to setoff and adjust spray powders accordingly.

  Note: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.

  ☐ f. Maintain fountain solution level in fountain and monitor distribution to plate.

  ☐ g. Check density of printed sheet every 100 sheets.

  Note: The following densities can be changed to meet each manufacturer's recommendations.

  1) Uncoated stock densities

    - The yellow density should be 85–90 points.
    - The magenta density should be 105–110 points.
    - The cyan density should be 100–105 points.
    - The black density should be 120–125 points.

2) Coated stock densities

- The yellow density should be 95–100 points.
- The magenta density should be 135–140 points.
- The cyan density should be 120–125 points.
- The black density should be 170–175 points.

☐ h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

☐ i. Repeat steps **6i** and **6l** through **6o** at the end of the press run.

☐ j. Remove last of printed sheets from delivery system.

☐ k. Wash up the press.

☐ l. Remove plate.

☐ m. Clean plate.

☐ n. Prepare plate for storage by applying gum to image side(s).

☐ o. Clean plate cylinder.

☐ p. Clean blanket.

☐ q. Clean impression cylinder.

☐ 10. Start next press run for second color. Repeat steps 2 through 9.

☐ 11. Start next press run for third color. Repeat steps 2 through 9.

☐ 12. Start next press run for fourth color. Repeat steps 2 through 9.

☐ 13. Return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

____

____

Objective 23

Job Sheet 16—Perform Perforation and Scoring

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

Evaluation Criteria	Rating
• Perforation and scoring material installed according to instructions	______
• Impression cylinder pressure adjusted to accommodate perforation and scoring material	______
• Even perforation and/or scoring maintained throughout press run	______

Basic Skills

Reading Critical Thinking Employability Technology

Introduction

This exercise will give the student experience in adjusting the press to perforate and score stock, a demand of many printing jobs in the commercial world.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Standard tools for specific press being set up
- Paper stock (specified by instructor)
- Ink (specified by instructor)
- Fountain solution (specified by instructor)
- Offset plate exposed for job to be scored or perforated
- Blanket (provided by instructor)
  Note: This operation will ruin the blanket for further use.
- Adhesive perforation and scoring material such as Lith-O-Perf
- Shop towels (rags)
- Cotton pads
- Blanket wash
- Plate etch

Procedure

☐ 1. Check with instructor before beginning this job sheet.

☐ 2. Set up sheet control systems. (See Job Sheet 1.)

☐ 3. Set up image control systems. (See Job Sheet 2.)

☐ 4. Makeready the press and job stock.

☐ 5. Make coarse adjustment of cylinder pressure to accommodate addition of adhesive perforation and scoring material.

☐ 6. Premoisten plate.

☐ 7. Turn on press.

☐ 8. Turn on water form roller.

☐ 9. Turn on ink form rollers.

☐ 10. Make image impression from plate to blanket to evaluate inking and plate position.

Note: Contact for three or four revolutions is usually enough.

☐ 11. Turn off ink form rollers.

☐ 12. Turn off water form roller.

☐ 13. Turn off press.

☐ 14. Attach commercial adhesive scoring and perforation material to impression cylinder.

  ☐ a. Remove paper backing.

  ☐ b. Carefully attach perforation or scoring material (whichever is specified in job ticket) to impression cylinder by pressing into position by hand and running fingers along length of material to seat it to the cylinder.

  Note: In some cases, adhesive perforation and scoring material will have to be seated firmly with a small hammer. In all cases, however, follow the manufacturer's directions for installation.

☐ 15. Turn on ink form rollers.

☐ 16. Turn on water form roller.

☐ 17. Turn on press.

☐ 18. Turn on air and vacuum.

☐ 19. Turn on feed lever; allow several sheets to be fed.

☐ 20. Turn off feed lever.

☐ 21. Turn off ink form rollers.

☐ 22. Turn off water form roller.

☐ 23. Turn off air and vacuum.

☐ 24. Turn off press.

☐ 25. Examine printed sheets to determine if image and perforation and scoring material are properly positioned; adjust as necessary.

☐ 26. Adjust blanket to impression cylinder pressure as necessary to assure even perforation or scoring.

☐ 27. Turn on ink form rollers.

☐ 28. Turn on water form roller.

☐ 29. Turn on press.

☐ 30. Turn on air and vacuum.

☐ 31. Adjust air and vacuum to accommodate paper stock.

☐ 32. Adjust double sheet detector to accommodate stock.

☐ 33. Complete press run.

  ☐ a. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

  ☐ b. Remove paper from receiving tray or stacker as required.

  ☐ c. Maintain fountain solution level in fountain and monitor distribution to plate.

  ☐ d. Remove a printed sheet from the delivery system periodically for inspection of image and perforation and/or scoring.

  ☐ e. Make necessary adjustments to maintain image position and quality, and to control paper feed and delivery throughout the press run.

☐ 34. Follow steps **20** through **24** to end the press run.

☐ 35. Remove last of printed sheets from the delivery system.

☐ 36. Remove perforation and scoring material from impression cylinder.

☐ 37. Remove blanket and discard.

Note: During the perforation and/or scoring, the blanket has been providing a resilient back pressure for the cutting operation. This wear ruins the blanket for future use unless it will be run again with this same plate and job specification. Because of this expense, many shops maintain a perforating and scoring machine, or are equipped with a letter press which can run a perf and score head.

☐ 38. Remove plate.

☐ 39. Clean plate (front and back).

☐ 40. Prepare plate for storage by applying gum to image side(s).

☐ 41. Clean plate cylinder and coat plate with etch.

☐ 42. Clean impression cylinder.

☐ 43. Return tools and equipment to proper storage.

Evaluator's Comments: ____________________

____

____

Unit 4

Preventive Maintenance and Troubleshooting

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Unit 4

Preventive Maintenance and Troubleshooting

Objective Sheet

Unit Objective

After completing this unit, the student should be able to troubleshoot basic press problems and conduct required daily, weekly, and monthly preventive maintenance on a sheet-fed offset press. The student should demonstrate these competencies by completing the assignment sheets and job sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to preventive maintenance and troubleshooting with their definitions.
2. List advantages of a routine, thorough preventive maintenance program.
3. Name the three areas of work in a preventive maintenance program.
4. Match preventive maintenance schedules with their descriptions.
5. Select true statements concerning requirements for a preventive maintenance schedule in chart form.
6. Select true statements concerning preventive maintenance procedures for daily cleanup.
7. List preventive maintenance procedures for weekly cleanup.
8. List preventive maintenance procedures for monthly cleanup.
9. Select correct procedures for daily, weekly, and monthly lubrication.
10. Complete a list of daily and weekly adjustment procedures.
11. List monthly adjustment requirements.
12. Arrange in order the steps in making an ink form roller check.
13. Identify ink stripe configurations.
14. Arrange in order the sequence of troubleshooting techniques.
15. List categories of press troubles.
16. Distinguish between types of emulsification.
17. Describe the technique for avoiding emulsification.
18. Select from a list conditions that create ink drying problems.
19. Match common ink problems on the press with their descriptions.

20. List guidelines for evaluating good print quality.
21. Match print quality problems with their causes.
22. Use a troubleshooting guide to find the best solution to an ink and dampening problem. (Assignment Sheet 1)
23. Use a troubleshooting guide to find the best solution to a paper stock problem. (Assignment Sheet 2)
24. Use a troubleshooting guide to find the best solution to a registration problem. (Assignment Sheet 3)
25. Use a troubleshooting guide to find the best solution to a process problem. (Assignment Sheet 4)
26. Use a troubleshooting guide to find the best solution to a mechanical problem. (Assignment Sheet 5)
27. Determine lubrication requirements for a specific press. (Assignment Sheet 6)
28. Set up a preventive maintenance schedule in chart form. (Assignment Sheet 7)
29. Take an inventory of spare parts. (Assignment Sheet 8)
30. Adjust dampener rollers to plate cylinder. (Job Sheet 1)
31. Adjust ink form rollers to plate. (Job Sheet 2)
32. Adjust plate cylinder to blanket cylinder. (Job Sheet 3)
33. Adjust blanket cylinder to impression cylinder. (Job Sheet 4)
34. Change a molleton cover. (Job Sheet 5)
35. Degrease plate and impression cylinders. (Job Sheet 6)
36. Deglaze ink rollers and blanket. (Job Sheet 7)
37. Change blanket. (Job Sheet 8)
38. Backflush vacuum pump. (Job Sheet 9)

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Information Sheet

Objective 1

Terms and definitions

a. **Blanket packing**—Substructure used to raise the blanket surface to bearer height

Note: This material comes in different uniform thicknesses.

b. **Blanket powder**—A powder used to protect the surface of a rubber offset blanket during storage and to aid in maintaining the blanket's resilience

c. **Chalking**—Ink on the paper turning dry and powdery

d. **Deglazer**—A cleaner used to dissolve dried ink, solvent, and gum deposits from the surfaces of press rollers and blanket

e. **Degreaser**—A cleaner used to remove oil and grease residue from the plate and impression cylinder surfaces

f. **Emulsification**—A mixing of ink and fountain solution affecting the separation of image and nonimage areas of the offset plate

g. **Ink glaze**—A thin layer of hardened ink, fountain solution, and blanket wash which forms on press rollers and blankets

h. **Misting**—Ink flying into atmosphere as fine mist, especially at high temperature and speed

i. **Paper glaze**—A thin layer of tiny particles of clay, sizing, lint, and other paper components that forms on the press rollers and blanket

j. **Picking**—Ink tearing away part of the paper coating as the sheet is printed; this appears as black spots in the blank areas of the printed sheet and white spots in the solid areas

k. **Piling**—Ink building up on rollers plate, and/or blanket

l. **Preventive maintenance**—The performance of routinely inspecting, cleaning, adjusting, lubricating, and making minor repairs which aid in preventing major equipment failure and process troubles

m. **Pumice powder**—Powdered volcanic rock used for cleaning and scouring surfaces which must be free of oil residue

n. **Scumming**—Plate picking up ink in the clear areas and transferring it to the clear area of the sheet

o. **Sensitized roller**—A rubber ink roller that will not hold ink on its surface because of fountain solution, etch, and other chemicals dried in the pores

p. **Set-off**—Ink transferred from the front surface of one sheet to the back surface of the sheet above in the delivery pile

q. **Tinting**—Emulsified ink suspended in the fountain solution on the plate surface appearing as a uniform tint on the printed sheet

r. **Toning**—Ink adhering to nonimage area of plate and transferring to printed sheet because of lack of dampening

s. **Trapping**—Ability of an ink to print over a previously applied ink

t. **Troubleshooting**—The process of analyzing problems to determine probable causes and applying possible solutions until a problem is solved

u. **Water miscible cleaner**—A cleaner that mixes with water to remove water soluble particles from press rollers, blanket, and cylinders

Objective 2

Advantages of a routine, thorough preventive maintenance program

a. Prevents time loss due to press breakdown

b. Lengthens life of rollers and blanket

c. Aids in delivering a clean product

d. Prevents excessive wear on moving parts

e. Insures longer periods of trouble-free press operation

f. Increases production

g. Insures good image transfer

h. Provides opportunity to locate and correct potential problems on a scheduled basis rather than during a production breakdown

i. Helps operator to be aware of potential problems

j. Helps operator to become more familiar with press mechanical functions

k. Helps operator to identify and correct troubles

l. Presents an impressive, organized workstation for view by the employer, customers, or visitors

Unit 5 Job Ticket and Cost Awareness

Unit Contents

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Student Components

Student Page

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Student Supplements

- 1—Sample Printing/Material Price Sheet 5–13
- 2—Sample Job Schedule 5–15
- 3—Sample Material Cost Sheet 5–17

Assignment Sheet

- 1—Estimate Costs of Printing Jobs 5–19

Suggested Activities

Instructional Plan

Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resources" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.
- Make transparencies from the transparency masters included in this unit. These appear in the teacher edition only.

Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss the assignment sheet. Review with students the criteria for evaluation of this activity.

Suggested Activities

Teaching Suggestions

- Collect sample job tickets and estimate sheets from local print shops.
- Have students complete a job ticket for a shop printing project.
- Invite local printers to address the class on cost awareness, waste management, pricing, and overall costs of doing business.
- Have students complete a job schedule similar to the sample shown in Student Supplement 2 when printing a job. By completing this schedule students should gain an understanding of how much time is spent in each phase of printing.
- When discussing objective 4 explain the importance of completing a material cost sheet similar to the sample shown in Student Supplement 3.
- Have students complete a material cost sheet (see Student Supplement 3) with an actual printing job so they can see the effect spoilage has on profit.
- If cost estimating software is available, show students how to operate it. Have students complete an exercise similar to Assignment Sheet 1 using the software.

Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.
- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.
- Evaluate the assignment sheet. Rate the student using the criteria listed on the assignment sheet. See Answers to Assignment Sheet for correct answers where applicable. If the student's performance is unacceptable, have the student review the appropriate materials and complete the assignment again.
- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

Resources Used in Developing This Unit

Print Media

- Destree, Thomas M. *The Lithographer's Manual.* 9th ed. Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.
- *Franklin Offset Catalog.* Salt Lake City, UT: Porte Publishing Co.
- Silver, Gerald A. *Printing Estimating Policies and Procedures.* Encino, CA: Editorial Enterprises, 1991.

Suggested Supplemental Resources

Print Media

- Lem, Dean Phillip. *Graphics Master 6.* Kihei, HI: Dean Lem Associates, Inc., 1997.—Print production sourcebook that links the newest electronic digital prepress applications with traditional print production methods. No. 1002
- *The New Graphic Communications Trade Customs/Business Practices.* Sponsored by GATF, NAPL, and PIA, 1994.—This book clearly defines and explains common business practices of the printing industry. No. 1004
- *Productivity Benchmarks: Sheetfed Printers Production Characteristics.* Compiled by PIA, 1999. No. 00BT99676
- Ruggles, Philip K. *Printing Estimating: Digital & Traditional Costing Methods for Graphic Imaging.* 4th ed. Albany, NY: Delmar Publishers Inc., 1996. No. 00FM4424

  This book covers estimating, outsourcing, cost estimating systems, and other printing industry information and how it applies to print estimating. A companion workbook (No. 00FM4425) is also available that includes approximately 200 estimating problems and answers.

The books listed above are available from:

Graphic Arts Technical Foundation
200 Deer Run Road
Sewickley, PA 15143-2600
Fax: 412-741-2311
Phone: 1-800-662-3916
www.gatf.org

Suggested Activities

Electronic Media

- Contact the following three companies for information about cost estimating software.

  Hagen Systems, Inc.
  6438 City West Parkway
  Eden Prairie, MN 55344
  Phone: 612-944-6865
  Toll Free: 1-888-Hagen OA (888-424-3662)
  http://www.hagenoa.com

  Franklin Cost Estimator
  Sales: 1-800-346-7363
  Fax: 1-801-322-5822
  http://www.franklin-estimating.com

  Logic Associates, Inc.
  221 Christian Street
  PO Box 765
  White River Junction, VT 05001-0765
  Sales: 1-888-505-6442
  http://www.zlogic.com

Answers to Assignment Sheet

Assignment Sheet 1

Estimate Costs of Printing Jobs

1. $34.25 (Based on costs for paper, simple composition, film price, and plate price given in Student Supplement 1.)

2. $77.50 (Based on costs for 8 1/2 x 11 paper, simple composition, film price, and plate price given in Student Supplement 1.)

Written Test

Name ____

Date ________________________________ Score___________

Objective 1

Match the terms with their definitions.

1. Benchmark
2. Estimate
3. Fixed cost
4. Gross profit
5. Invoice
6. Labor
7. Markup
8. Materials
9. Net profit
10. Quotation
11. Variable cost

_____ a. That part of the cost which is an hourly wage rate paid to employees working on the job

_____ b. The consumable items required for the printing job, such as paper, ink, plates, etc.

_____ c. A detailed statement of all costs and charges related to a printing job

_____ d. Any cost that does not change with production volume, such as rent or utilities

_____ e. Any cost that increases or decreases directly with production volume, such as paper, ink, and film

_____ f. A predetermined percentage added to the job price to recover combined expenses and profit

_____ g. The amount of revenue left after direct printing costs have been paid

_____ h. The amount of revenue left after all costs, fixed and variable, have been paid

_____ i. The actual selling price of the printing job, quoted and recorded

_____ j. The bill for the customer's printing job

_____ k. A fixed time that a job is estimated to take in each phase

Written Test

Objective 2

List three fixed costs and three variable costs of a printing job.

a. Fixed costs

- ______________________________
- ______________________________
- ______________________________

b. Variable costs

- ______________________________
- ______________________________
- ______________________________

Objective 3

List six cost items to consider when giving an estimate on a printing job.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

Objective 4

Select from a list cost awareness factors for a successful printing business by placing an "X" in each appropriate blank.

_____ a. Net profit

_____ b. Production quality

_____ c. Advertising

_____ d. Wages and salaries

_____ e. Cost of equipment

_____ f. High prices

_____ g. Waste management

Objective 5

Select proper practices for waste management in the printing shop by placing an "X" in each appropriate blank.

_____ a. Throw away useless trim waste.

_____ b. Save plates and negatives for silver and aluminum reclamation.

_____ c. Schedule press runs randomly.

_____ d. Plan bulk paper cuts carefully to avoid waste.

Objective 6

State the definition of a job ticket.

____

____

____

____

Objective 7

Select the components of a job ticket by placing an "X" in each appropriate blank.

_____ a. Stock to be used

_____ b. Profit and loss statement

_____ c. Proofing information

_____ d. Bindery services

____ e. Typesetting

____ f. Ink to be used

____ g. Spoilage

____ h. Press run times

____ i. Outside printing and bindery services

____ j. Cost estimates

Objective 8

Select true statements concerning printing trade customs by placing an "X" in each appropriate blank.

_____ a. Printer is not responsible for errors if work is completed with customer's approval.

_____ b. An extra charge will be made if a delay on the press results from awaiting customer's approval of press proofs.

Written Test

_____ c. Experimental work shall be done free of charge.

_____ d. Overruns or underruns of up to 25% shall constitute an acceptable delivery.

_____ e. Terms shall be net cash within thirty days unless otherwise specified, and claims must be made within five days of receipt of goods.

_____ f. All agreements are contingent upon fires, strikes, accidents, wars, floods, or other causes beyond the printer's control.

_____ g. There shall be no variation in color between color proofs and the completed job.

_____ h. Changes made by the customer shall be made free of charge.

_____ i. All sketches, dummies, negatives, and plates shall be returned to the customer after work is completed.

_____ j. Regular orders cannot be cancelled unless an agreement to cover the printer's loss has been made.

_____ k. Customer shall be charged for handling and storing personal paper stock or printed matter held over thirty days.

***Permission to duplicate this test is granted.**

Answers to Written Test

Objective 1

a. 6
b. 8
c. 2
d. 3
e. 11
f. 7
g. 4
h. 9
i. 10
j. 5
k. 1

Objective 2

Answer should include any three of the following in each group:

a. Fixed costs
- Insurance
- Advertising
- Taxes
- Building rental
- Utilities
- Maintenance

b. Variable costs
- Labor
- Paper
- Ink
- Plates
- Film

Objective 3

Any six of the following:

a. Typesetting
b. Scanning
c. Graphic design
d. Line negatives
e. Halftone negatives
f. Plates
g. Press runs
h. Ink
i. Bindery charges
j. Paper stock
k. Labor
l. Outsourcing

Objective 4

a, b, d, e, g

Objective 5

b, d

Objective 6

A job ticket is the formal written specification sheet which serves as a blueprint for the printing job and follows a job from order taking to delivery.

Objective 7

a, c, d, e, f, h, i

Objective 8

a, b, e, f, j, k

Unit 5 Job Ticket and Cost Awareness

Prerequisites:
None

Learning Activities Sheet

Student Name ____

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 3, and Student Supplement 1.

☐ 4. **Do** Assignment Sheet 1, "Estimate Costs of Printing Jobs."

☐ 5. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 6. If the evaluation is not satisfactory, repeat steps 3 and 4.

☐ 6. **Study** Information Sheet, Objectives 4 through 8, and Student Supplement 2 and Student Supplement 3.

☐ 7. **Check** With instructor for any additional assignments to be completed.

☐ 8. **Do** Additional assignments listed below.

____

____

____

☐ 9. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 10. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

***Permission to duplicate this form is granted.**

Sample Estimate Sheet

Estimate Sheet

Customer ______________________________

Job Title ______________________________

Quantity ____________ of ______ Size ____________

Talked to: ______________ Phone ____________

	Est. Hrs.	Est. Cost
Typesetting-Text		
Graphic design		
Scanning		
Ink: ___ Black ___ PMS		
___ PMS ___ PMS		
Foil stamped		
Negatives:		
Line: No. _____ Size _______		
Halftone: No. _____ Size _______		
PMT: No. _____ Size _______		
Plates: 10x15 @		
11x17 @		
18x24 @		
Stock:		
Cover		
Press Run: 10x15 @		
11x17 @		
18x24 @		
Washup: Color		
Bindery: Cut-Trim		
Collate		
Fold		
Pad Punch		
Staple		
Outsourcing:		
Other:		
Cost		
Tax		
Mark-Up		
Total		

Date Est. ____________

Bring In ____________

Date Wanted __________

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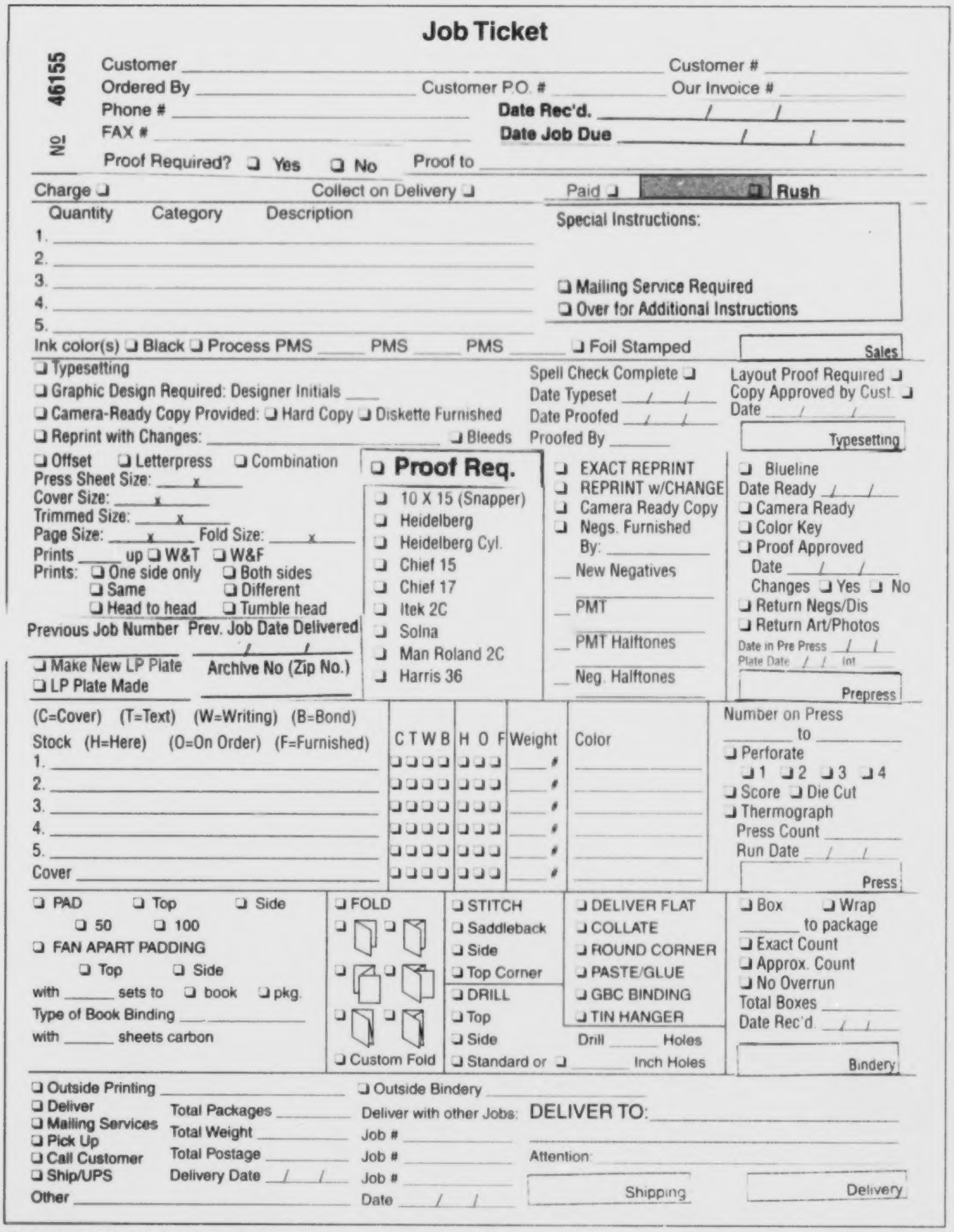
Sample Job Ticket



Job Ticket

No 46155

Customer ____________ Customer # ______
Ordered By ____________ Customer P.O. # ______ Our Invoice # ______
Phone # ____________ **Date Rec'd.** ___/___/___
FAX # ____________ **Date Job Due** ___/___/___
Proof Required? ☐ Yes ☐ No Proof to ____________

Charge ☐ Collect on Delivery ☐ Paid ☐ ☐ **Rush**

Quantity Category Description
1. ____________
2. ____________
3. ____________
4. ____________
5. ____________

Special Instructions:

☐ Mailing Service Required
☐ Over for Additional Instructions

Ink color(s) ☐ Black ☐ Process PMS ____ PMS ____ PMS ____ ☐ Foil Stamped

Sales

☐ Typesetting
☐ Graphic Design Required: Designer Initials ____
☐ Camera-Ready Copy Provided: ☐ Hard Copy ☐ Diskette Furnished
☐ Reprint with Changes: ____________ ☐ Bleeds

Spell Check Complete ☐
Date Typeset ___/___/___
Date Proofed ___/___/___
Proofed By ______

Layout Proof Required ☐
Copy Approved by Cust. ☐
Date ___/___/___

Typesetting

☐ Offset ☐ Letterpress ☐ Combination
Press Sheet Size: ____ x ____
Cover Size: ____ x ____
Trimmed Size: ____ x ____
Page Size: ____ x ____ Fold Size: ____ x ____
Prints ____ up ☐ W&T ☐ W&F
Prints: ☐ One side only ☐ Both sides
☐ Same ☐ Different
☐ Head to head ☐ Tumble head

Previous Job Number ______ Prev. Job Date Delivered ___/___/___
☐ Make New LP Plate
☐ LP Plate Made
Archive No (Zip No.) ______

☐ **Proof Req.**
- ☐ 10 X 15 (Snapper)
- ☐ Heidelberg
- ☐ Heidelberg Cyl.
- ☐ Chief 15
- ☐ Chief 17
- ☐ Itek 2C
- ☐ Solna
- ☐ Man Roland 2C
- ☐ Harris 36

☐ EXACT REPRINT
☐ REPRINT w/CHANGE
☐ Camera Ready Copy
☐ Negs. Furnished
By: ______
__ New Negatives ______
__ PMT ______
__ PMT Halftones ______
__ Neg. Halftones ______

☐ Blueline
Date Ready ___/___/___
☐ Camera Ready
☐ Color Key
☐ Proof Approved
Date ___/___/___
Changes ☐ Yes ☐ No
☐ Return Negs/Dis
☐ Return Art/Photos
Date in Pre Press ___/___/___
Plate Date ___/___/___ Int ____

Prepress

(C=Cover) (T=Text) (W=Writing) (B=Bond)

Stock (H=Here) (O=On Order) (F=Furnished)	C	T	W	B	H	O	F	Weight	Color
1. ____________	☐	☐	☐	☐	☐	☐	☐	____ #	______
2. ____________	☐	☐	☐	☐	☐	☐	☐	____ #	______
3. ____________	☐	☐	☐	☐	☐	☐	☐	____ #	______
4. ____________	☐	☐	☐	☐	☐	☐	☐	____ #	______
5. ____________	☐	☐	☐	☐	☐	☐	☐	____ #	______
Cover ____________	☐	☐	☐	☐	☐	☐	☐	____ #	______

Number on Press
______ to ______
☐ Perforate
☐ 1 ☐ 2 ☐ 3 ☐ 4
☐ Score ☐ Die Cut
☐ Thermograph
Press Count ______
Run Date ___/___/___

Press

☐ PAD ☐ Top ☐ Side
☐ 50 ☐ 100
☐ FAN APART PADDING
☐ Top ☐ Side
with ____ sets to ☐ book ☐ pkg.
Type of Book Binding ____________
with ____ sheets carbon

☐ FOLD
☐ ☐
☐ ☐
☐ ☐
☐ Custom Fold

☐ STITCH
☐ Saddleback
☐ Side
☐ Top Corner

☐ DRILL
☐ Top
☐ Side
☐ Standard or ☐ ____ Inch Holes
Drill ____ Holes

☐ DELIVER FLAT
☐ COLLATE
☐ ROUND CORNER
☐ PASTE/GLUE
☐ GBC BINDING
☐ TIN HANGER

☐ Box ☐ Wrap
____ to package
☐ Exact Count
☐ Approx. Count
☐ No Overrun
Total Boxes ______
Date Rec'd ___/___/___

Bindery

☐ Outside Printing ____________ ☐ Outside Bindery ____________
☐ Deliver
☐ Mailing Services
☐ Pick Up
☐ Call Customer
☐ Ship/UPS
Other ____________

Total Packages ______
Total Weight ______
Total Postage ______
Delivery Date ___/___/___

Deliver with other Jobs:
Job # ______
Job # ______
Job # ______
Date ___/___/___

DELIVER TO: ____________
____
Attention: ____________

Shipping

Delivery

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TM 2

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Unit 6 Calculating Paper Cutting

Unit Contents

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(Techniques to Avoid Unwanted Imaging) 6–19

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3—Calculate a Combination Cut Using Stock Cutting Formula 6–17
4—Draw a Cutting Diagram 6–19

Job Sheet

1—Cut Carbonless Paper 6–21

Suggested Activities

Instructional Plan

Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resources" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.
- Make a transparency from the transparency master included in this unit. This appears in the teacher edition only.

Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss the assignment sheets. Review with students the criteria for evaluation of these activities.

Suggested Activities

- Discuss and demonstrate the job sheet. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of this activity and the rating scale that will be used to indicate job performance.

Teaching Suggestions

- Discuss with students how paper weight and texture affect cutting.
- Demonstrate hand jogging procedure in class, then have students demonstrate hand jogging.
- Demonstrate safety rules for operating paper cutters.
- Have students trim a three-sided book, if possible.

Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.
- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.
- Evaluate the assignment sheets. Rate the student using the criteria listed on each assignment sheet. See Answers to Assignment Sheets for correct answers where applicable. If the student's performance is unacceptable, have the student review the appropriate materials and complete the assignment again.
- Evaluate the job sheet. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

  Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

  Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

Suggested Activities

Two sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

Sample A

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

Sample B

Yes—Can perform job with no additional training.
No—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

Resources Used in Developing This Unit

Print Media

- Cogoli, John E. *Photo-Offset Fundamentals.* Old Tappan, NJ: Macmillan Publishing Co., Inc., 1986.
- Hird, Kenneth F. *Offset Lithographic Technology.* Tinley Park, IL: Goodheart-Willcox Publisher, 1995.
- Prust, Z. A. *Photo-Offset Lithography.* Tinley Park, IL: Goodheart-Willcox Publisher, 1977.
- *Safety Practices for the Graphic Arts.* Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.
- Spence, William D., and David G. Vequist. *Graphic Reproduction.* Westerville, OH: Glencoe McGraw-Hill, 1980.

Suggested Activities

Suggested Supplemental Resources

Print Media

- Destree, Thomas M. *The Lithographers Manual.* 9th ed. Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.—Covers every aspect of production practice and theory. No. 1320
- Wilson, Lawrence A. *What the Printer Should Know About Paper.* 3rd ed. Pittsburgh, PA: Graphic Arts Technical Foundation, 1998.—Provides printers with practical information on a wide variety of topics related to paper and its use. No. 13083

The books listed above are available from:

Graphic Arts Technical Foundation
200 Deer Run Road
Sewickley, PA 15143-2600
Fax: 412-741-2311
Phone: 1-800-662-3916
www.gatf.org

Electronic Media

- *Papers for Printing.* Order Number NIM-119-02-V53

This video takes the viewer through how to figure jobs, allowances for spoilage, and how to write a paper specification as well as a multitude of other paper related printing issues.

Available from:

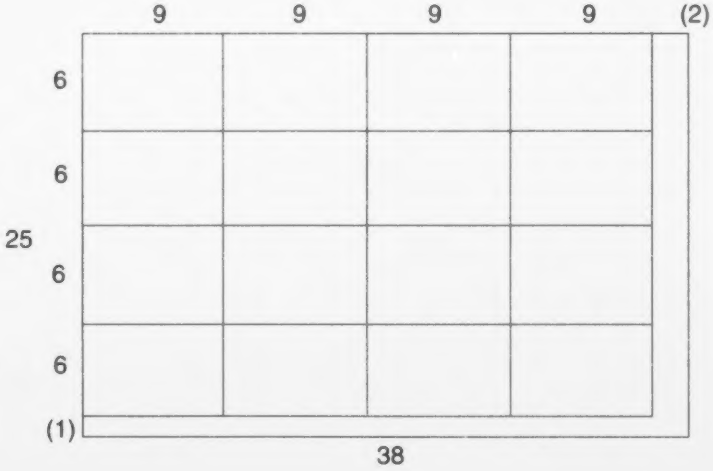
NIMCO
P.O. Box 9
102 Hwy. 81 N.
Calhoun, KY 42327-0009
Sales: 1-800-962-6662
www.nimcoinc.com

Answers to Assignment Sheets

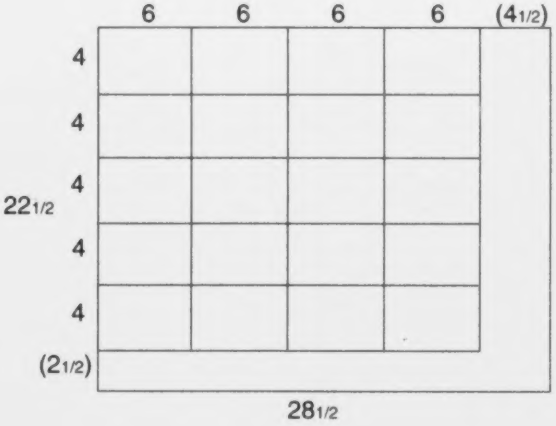
Assignment Sheet 1

Use the Formula for Cutting Paper Stock

1. a. 16
   b. 12
   c.


9
9
9
9
(2)
6
6
25
6
6
(1)
38

2. a. 20
   b.


6
6
6
6
(4½)
4
4
4
22½
4
4
(2½)
28½

3. 56

Answers to Assignment Sheets

Assignment Sheet 2

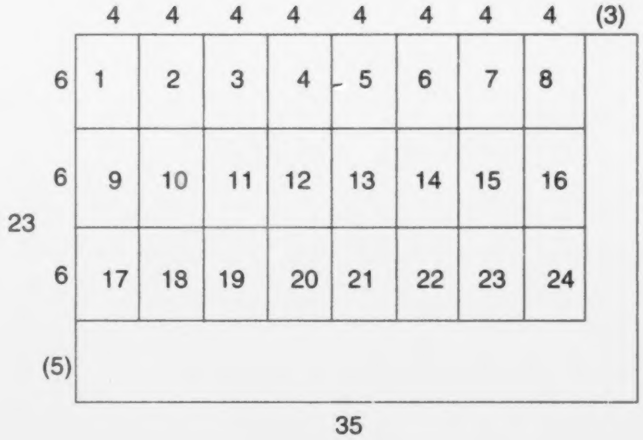
Use the Formula to Determine How Many Sheets Will Be Required

1. 30
2. 34

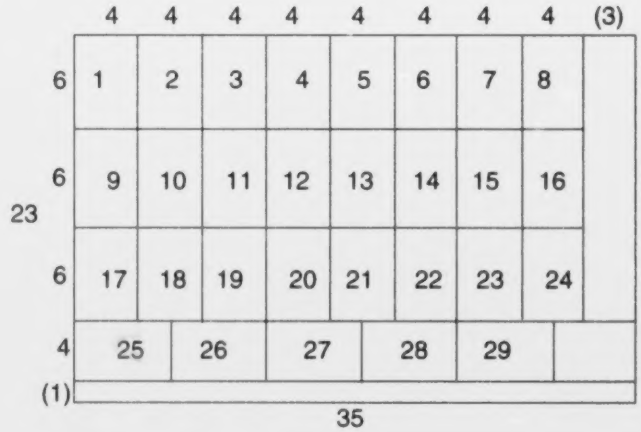
Assignment Sheet 3

Calculate Combination Cut Using Stock Cutting Formula

1. 24
2. a.


4 4 4 4 4 4 4 4 (3)
6
6
6
23
(5)
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
35

b.


4 4 4 4 4 4 4 4 (3)
6
6
6
4
(1)
23
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
25 26 27 28 29
35

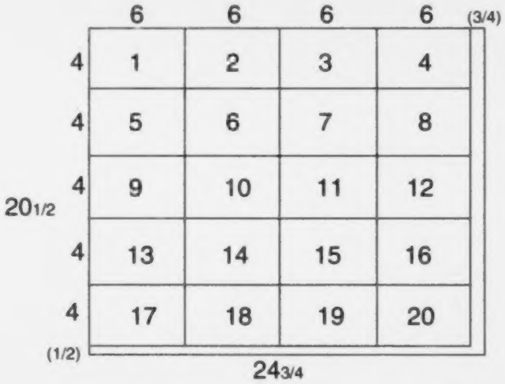
3. 5

Answers to Assignment Sheets

Assignment Sheet 4

Draw a Cutting Diagram

1. 20
2. Diagram should look like the following:


6
6
6
6
(3/4)
4
4
4
4
4
20 1/2
(1/2)
24 3/4
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Written Test

Name ____

Date ____________________________ Score__________

Objective 1

Match the terms with their definitions.

1. Carbonless paper
2. Combination cut
3. Cutting diagram
4. Jogging
5. Jogging boards
6. Lift
7. Mechanical jogging table
8. Piece
9. Spoilage allowance
10. Trim cut

_____ a. Cut that allows for actual outside dimensions of a piece of printed matter to be cut after printing is completed

_____ b. Percentage of extra sheets added to the total job for replacing soiled, damaged, or misprinted sheets and for samples to run when setting up the press

_____ c. Paper coated or impregnated with chemicals to yield an image when pressure is applied

_____ d. Second cut, made in stock cutting, when grain direction is not a factor, and additional pieces can be cut from the waste of the first cut

_____ e. Job-size portion cut from the full-size sheet

_____ f. Device used to vibrate sheets into neat lifts

_____ g. Proportional drawing which maps the most cost-efficient method of cutting sheets for a given job

_____ h. Handling of sheets to make a neat, evenly piled stack

_____ i. Wooden tools or blocks used to move or adjust lifts of paper on paper cutter so as to avoid accidentally placing hands or fingers in the way of the cutting blade

_____ j. Stack of paper being cut or handled

Written Test

Objective 2

Select true statements concerning safety rules for operating a paper cutter by placing an "X" in the appropriate blanks.

_____ a. Check the safety bolt and brake action on powered cutters periodically.

_____ b. Never disable two-hand controls.

_____ c. Never reach under the knife to remove scrap or straighten a lift.

_____ d. Attempt to catch a falling stack of cut stock during the cutting cycle if a backup board is not in use.

_____ e. Keep the cutter and surrounding floor area free of tools, paper, and shop towels.

_____ f. Avoid distractions while operating the cutter.

_____ g. Helpers and other shop personnel must stand near the cutter during cutting cycles.

_____ h. All knives and cutting sticks are to be changed according to machine's operating manual.

_____ i. Keep all spare knives bolted to mounting boards.

_____ j. Always turn off power to cutter before leaving the machine unattended.

Objective 3

State the purpose of jogging paper before cutting.

____

____

Objective 4

List the two types of paper cutters.

a. ____

b. ____

Objective 5

Describe two techniques for cutting carbonless paper.

a. ____

b. ____

Objective 6	State the formula for cutting paper stock.
Objective 7	State the formula for determining the number of sheets to be cut for a printing job.
Objective 8	State the formulas for making a combination cut.

***Permission to duplicate this test is granted.**

Answers to Written Test

Objective 1

a. 10
b. 9
c. 1
d. 2
e. 8
f. 7
g. 3
h. 4
i. 5
j. 6

Objective 2

b, c, e, f, h, i, j

Objective 3

To ensure that all sheets of paper are cut the same size

Objective 4

a. Hand-lever paper cutter
b. Electric or electro-hydraulic paper cutter

Objective 5

a. Use a wood block and sponge buffer.
b. Cut two or more lifts at one time.

Objective 6

$$\frac{\text{Dimensions of Sheet}}{\text{Dimensions of Piece to Be Cut}} = \text{Number of Pieces Cut From Sheet}$$

Objective 7

$$\frac{\text{Desired Number of Pieces}}{\text{Number of Pieces Obtained From One Sheet}} = \text{Total Number of Sheets Needed}$$

Objective 8

a.

$$\frac{\text{Dimensions of Sheet}}{\text{Dimensions of Piece to Be Cut}} = \text{Number of Pieces Cut From Sheet}$$

b.

$$\frac{\text{Waste Portion}}{\text{Dimensions of Piece to Be Cut}} = \text{Number of Pieces Obtained}$$

Prerequisites:
None

Learning Activities Sheet

Student Name ________________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 through 6.

☐ 4. **Do** Assignment Sheet 1, "Use the Formula for Cutting Paper Stock."

☐ 5. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 6. If the evaluation is not satisfactory, repeat steps 3 and 4.

☐ 6. **Study** Information Sheet, Objective 7.

☐ 7. **Do** Assignment Sheet 2, "Use the Formula to Determine How Many Sheets Will Be Required."

☐ 8. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 9. If the evaluation is not satisfactory, repeat steps 6 and 7.

☐ 9. **Study** Information Sheet, Objective 8.

☐ 10. **Do** Assignment Sheet 3, "Calculate a Combination Cut Using Stock Cutting Formula."

☐ 11. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 12. If the evaluation is not satisfactory, repeat steps 9 and 10.

Learning Activities Sheet

☐ 12. **Do** Assignment Sheet 4, "Draw a Cutting Diagram."

☐ 13. **Stop** Have instructor evaluate the completed assignment sheet and if the evaluation is satisfactory, continue to step 14. If the evaluation is not satisfactory, repeat step 12.

☐ 14. **Observe** Demonstration of procedures to be used in completing Job Sheet 1.

☐ 15. **Do** Job Sheet 1, "Cut Carbonless Paper."

☐ 16. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 17. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat steps 14 and 15.

☐ 17. **Check** With instructor for any additional assignments to be completed.

☐ 18. **Do** Additional assignments listed below.

____

____

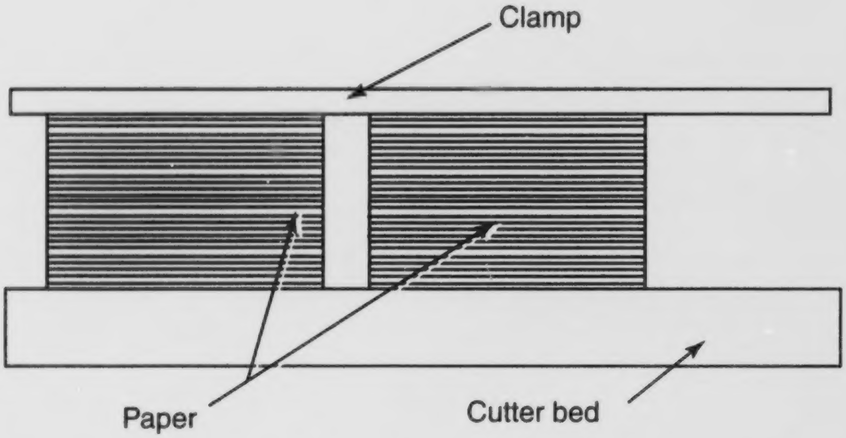
____

☐ 19. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

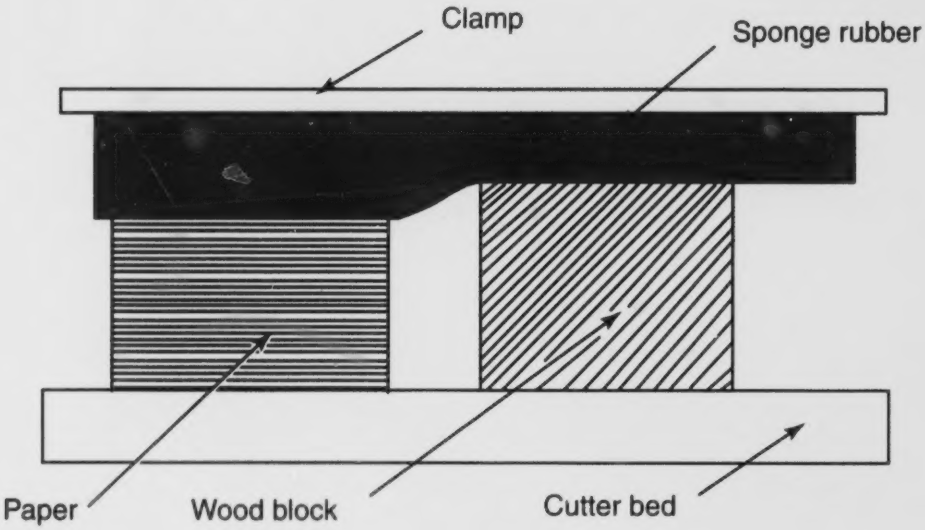
☐ 20. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

***Permission to duplicate this form is granted.**

Cutting Carbonless Paper (Techniques to Avoid Unwanted Imaging)


Clamp
Paper
Cutter bed

Cutting two or more lifts at one time will reduce pressure that can cause unwanted imaging.


Clamp
Sponge rubber
Paper
Wood block
Cutter bed

Using a wood block and sponge rubber will prevent excessive pressure that can cause imaging.

TM 1

Unit Contents

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  4—Fold Paper Using a Folding Machine 7–19
  5—Hand Fold, Collate, and Staple a Booklet 7–21
  6—Score a Job 7–23

Suggested Activities

Instructional Plan

Preparation

- Read the unit carefully and plan for instruction.
- Review "Teaching Suggestions." Plan for classroom activities.
- Plan your presentation to take advantage of student learning styles and to accommodate special-needs students.
- Prepare classroom. Put up posters and charts and display articles and other references related to this unit.
- Obtain films, videotapes, and other resources to supplement instruction of this unit. See "Resources Used in Developing This Unit" and "Suggested Supplemental Resources" for more information.
- For self-paced instruction, review Learning Activities Sheet. Modify as appropriate to include additional activities and/or resources available in your classroom. Make one copy for each student.
- Make a transparency from the transparency master included in this unit. This appears in the teacher edition only.

Delivery and Application

Unit Introduction (self-paced instruction)

- Provide student with Learning Activities Sheet and unit of instruction.
- Review unit contents with student.
- Have the student complete the steps in the learning activities sheet.

Unit Introduction (group instruction)

- Provide students with unit of instruction.
- Discuss unit and specific objectives.
- Discuss the information sheet. Implement teaching plan to localize, supplement, and personalize the unit. Reinforce basic academic and workplace skills when applicable.
- Discuss and demonstrate the job sheets. Make sure all required tools, equipment, and materials are available. Review with students the criteria for evaluation of these activities and the rating scale that will be used to indicate job performance.

Suggested Activities

Teaching Suggestions

- Take a field trip to a local print shop to observe binding and finishing operations in action.
- Invite a local printer or bindery worker to address the class concerning job specifications, customer relations, customer service, and meeting customer needs.

Evaluation

- Make copies of the written test. Add or modify test items as needed. The written test serves as both a pretest and posttest to assist in measuring each student's competency gains.
- Give and evaluate pretest. Modify lesson plan to include additional instruction for those areas where students were deficient.
- Evaluate the job sheets. When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in the student edition. Then observe the student performing the procedure.

Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily completed the process step(s) for each checkpoint area. If the student is unable to complete the procedure correctly, have the student review the materials and try again.

Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria that are provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

Two sample performance evaluation keys have been provided below and on the following page. Many other keys are available. Select one rating (grading scale) that best fits your program needs.

Sample A

4—**Skilled**—Can perform job with no additional training.
3—**Moderately skilled**—Has performed job during training program; limited additional training may be required.
2—**Limited skill**—Has performed job during training program; additional training is required to develop skill.
1—**Unskilled**—Is familiar with process, but is unable to perform job.
0—**No exposure**—No information or practice provided during training program.

Sample B

Yes—Can perform job with no additional training.
No—Is unable to perform job satisfactorily.

- Give and evaluate the posttest.
- Meet individually with students to evaluate their progress through this unit of instruction and indicate to them possible areas of improvement.
- Reteach and retest as required.

Resources Used in Developing This Unit

Print Media

- Cogoli, John E. *Photo-Offset Fundamentals.* Old Tappan, IL: Macmillan Publishing Co., Inc., 1986.
- *Pocket Pal: A Graphic Arts Production Handbook.* Memphis, TN: International Paper Company, 1997.
- Prust, Z.A. *Photo-Offset Lithography.* Tinley Park, IL: Goodheart-Willcox Publisher, 1977.

Suggested Supplemental Resources

Print Media

- Lyman, Ralph. *Binding and Finishing.* Pittsburgh, PA: Graphic Arts Technical Foundation, 1993.—This book discusses binding and finishing in depth. No. 1542
- Tedesco, T.J. *Binding, Finishing, and Mailing: The Final Word.* Pittsburgh, PA: Graphic Arts Technical Foundation, 1999.—Discusses most major binding and finishing processes on both a micro and macro level, illustrating more effective management of postpress projects and providing insight on the bigger picture. No. 1558

The books listed above are available from:

Graphic Arts Technical Foundation
200 Deer Run Road
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Written Test

Name ______________________________

Date ______________________ Score __________

Objective 1

Match the terms with their definitions.

1. Binding
2. Collating
3. Finishing
4. Inserting
5. Jogging
6. Marrying sets
7. Padding
8. Perforating
9. Scoring
10. Stitching
11. Tipping
12. Trimming

_____ a. Creasing a sheet mechanically or manually to enable it to fold easily

_____ b. Partially cutting a sheet in a broken line so it can easily be torn away

_____ c. Applying a small amount of adhesive to the edge of a sheet so it can be attached to another

_____ d. Gathering, arranging in order and checking several sheets to make a book

_____ e. Placing one signature, sheet, or folded sheet inside another

_____ f. Binding pages of a book together using wire stitches or staples

_____ g. Cutting the edges of a bound book to make them even

_____ h. Binding a booklet or multi-page job using an adhesive padding compound

_____ i. Securing pages together by means of wire, thread, adhesive, plastic, etc.

_____ j. Final bindery work, such as die cutting, varnishing, flocking, laminating or embossing

_____ k. Vibrating paper by machine or by hand to make sure all sheets line up evenly at the edges

_____ l. Joining collated sets when number of pages exceeds collator capacity

Written Test

Objective 2

Select true statements concerning various binding techniques by placing an "X" in the appropriate blanks.

_____ a. Books which must stand up to hard use require edition binding.

_____ b. In edition binding, several signatures are sewn together and glued.

_____ c. Adhesive binding is used for less expensive books.

_____ d. Top quality books use a form of adhesive binding.

_____ e. In perfect binding, the back or folded edge of the book is sawed off and glued.

____ f. A brittle glue is used to attach the cover in perfect binding.

____ g. In plastic binding, rectangular slots are punched in the sheets.

____ h. Pages cannot be added or changed in plastic bound books.

____ i. The ring binder is an example of loose-leaf binding.

Objective 3

List four major paper folding styles.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

Objective 4

List four processes associated with finishing activities.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

***Permission to duplicate this test is granted.**

Answers to Written Test

Objective 1

a.	9	e.	4	i.	1
b.	8	f.	10	j.	3
c.	11	g.	12	k.	5
d.	2	h.	7	l.	6

Objective 2

a, b, c, e, g, i

Objective 3

Any four of the following:

a. Accordion fold
b. Gate fold
c. Letter fold
d. Map fold
e. French fold
f. Broadside fold

Objective 4

Any four of the following:

a. Foil stamping
b. Embossing
c. Laminating
d. Varnishing
e. Flocking

Prerequisites:
None

Learning Activities Sheet

Student Name ______________________________

Place a checkmark in the appropriate box as you complete each of the steps below.

☐ 1. **Take** Pretest provided by instructor. After test has been evaluated, follow instructor's recommendations.

☐ 2. **Read** Objective Sheet.

☐ 3. **Study** Information Sheet, Objectives 1 and 2, and Student Supplement 1.

☐ 4. **Observe** Demonstration of procedures to be used in completing Job Sheet 1.

☐ 5. **Do** Job Sheet 1, "Pad 20-Pound Stock."

☐ 6. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 7. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 1 and repeat steps 3 through 5.

☐ 7. **Observe** Demonstration of procedures to be used in completing Job Sheet 2.

☐ 8. **Do** Job Sheet 2, "Pad Carbonless Paper."

☐ 9. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 10. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 2 and repeat steps 7 and 8.

☐ 10. **Observe** Demonstration of procedures to be used in completing Job Sheet 3.

☐ 11. **Do** Job Sheet 3, "Drill Paper Stock for a 3-Ring Binder."

☐ 12. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 13. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 3 and repeat steps 10 and 11.

☐ 13. **Study** Information Sheet, Objectives 3 and 4.

☐ 14. **Observe** Demonstration of procedures to be used in completing Job Sheet 4.

☐ 15. **Do** Job Sheet 4, "Fold Paper Using a Folding Machine."

☐ 16. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 17. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 4 and repeat steps 14 and 15.

Optional

☐ 17. **Interview** Three employees in the binding and finishing department of a print shop to learn about possible career opportunities.

☐ 18. **Observe** Demonstration of procedures to be used in completing Job Sheet 5.

☐ 19. **Do** Job Sheet 5, "Hand Fold, Collate, and Staple a Booklet."

☐ 20. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 21. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 5 and repeat steps 18 and 19.

☐ 21. **Observe** Demonstration of procedures to be used in completing Job Sheet 6.

☐ 22. **Do** Job Sheet 6, "Score a Job."

☐ 23. **Stop** Have instructor evaluate your performance and if the evaluation is satisfactory, continue to step 24. If the evaluation is not satisfactory, study the procedure outlined in Job Sheet 6 and repeat steps 21 and 22.

☐ 24. **Check** With instructor for any additional assignments to be completed.

☐ 25. **Do** Additional assignments listed below.

____

____

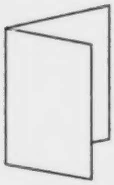
____

☐ 26. **Take** Posttest provided by instructor. After test has been evaluated, follow instructor's recommendations.

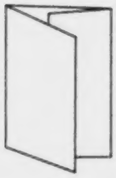
☐ 27. **Stop** Have instructor evaluate your unit performance. If the evaluation is satisfactory, proceed to next learning activities sheet. If evaluation is not satisfactory, ask instructor for further instructions.

***Permission to duplicate this form is granted.**

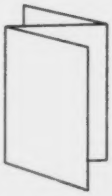
Folding Styles



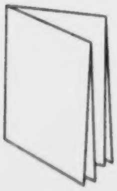
4-Page



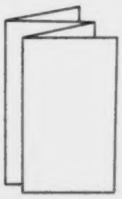
6-Page



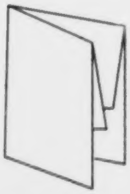
6-Page Accordion



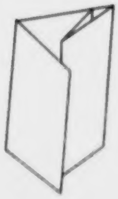
8-Page
French Fold



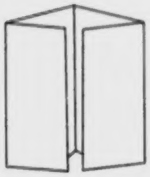
8-Page
Accordion



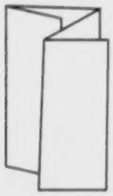
8-Page
Short Fold



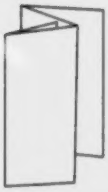
8-Page
Parallel (3 Folds)



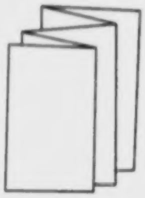
8-Page
Gate Fold



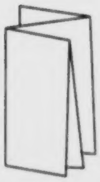
8-Page
Map Fold



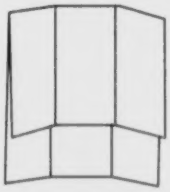
8-Page
Reverse Map



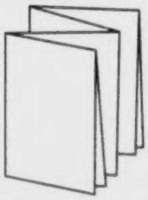
10-Page
Accordion



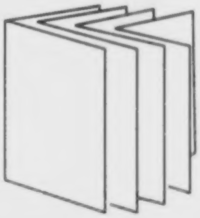
12-Page
Letter Fold



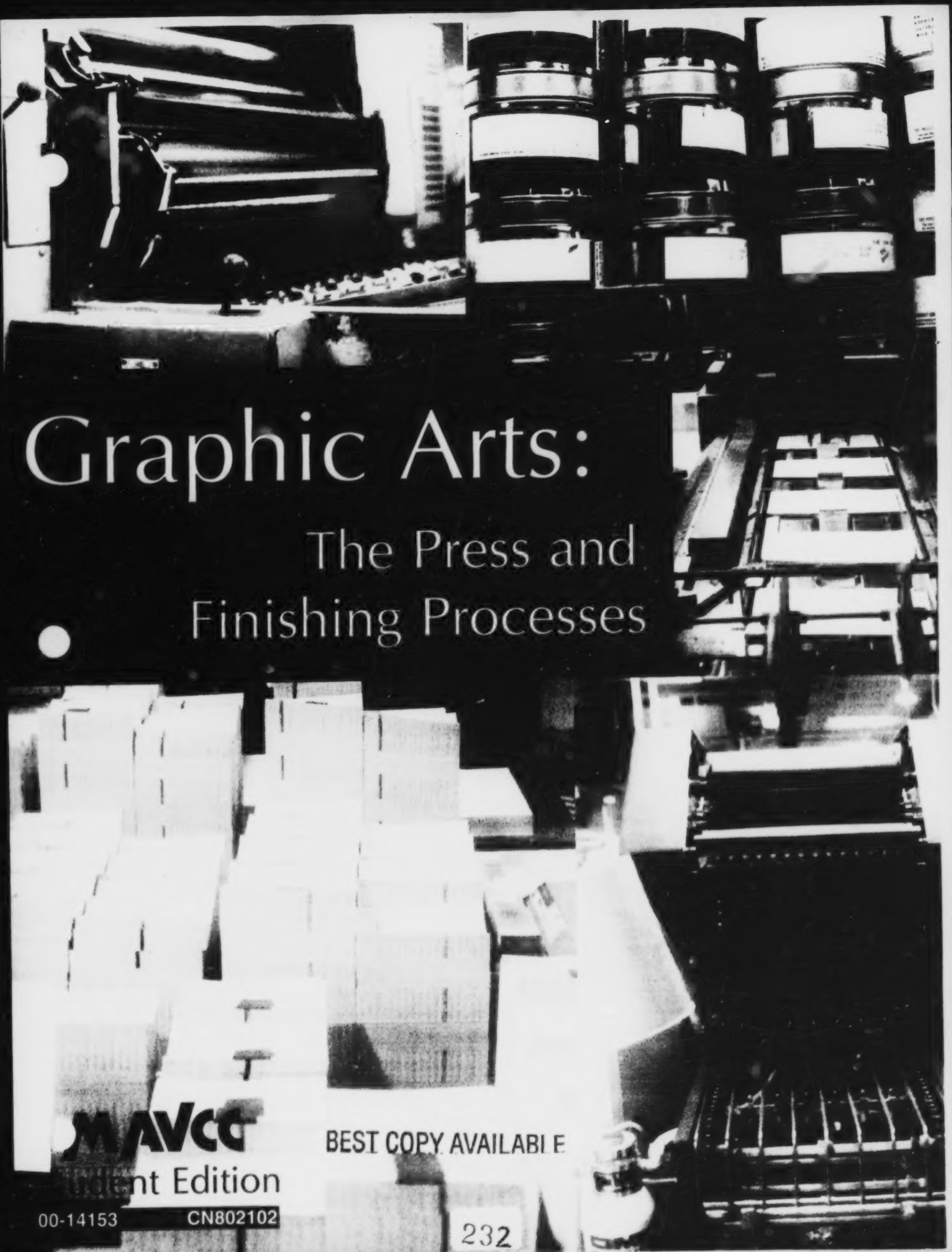
12-Page
Broadside



16-Page
Broadside



16-Page
Booklet



Graphic Arts:

The Press and Finishing Processes

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Graphic Arts

The Press and Finishing Processes

Fourth Edition

Student Edition

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Objective Sheet

Unit Objective

After completing this unit, the student should have a working knowledge of the basic theory of offset printing and be able to identify the basic systems and various components of a typical sheet fed offset press. The student should demonstrate these competencies by completing the job sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to offset press systems with their definitions.
2. State the basic theory of offset printing.
3. Identify the basic systems of a typical sheet fed offset press.
4. Match the basic systems of a typical sheet fed offset press with their functions.
5. Identify the components of the feeder system.
6. Match components of the feeder system with their functions.
7. Match the types of feeder systems with their operations.
8. Identify the components of the register system.
9. Match components of the register system with their functions.
10. Name the two types of register systems.
11. Identify the components of the cylinder system.
12. Match components of the cylinder system with their functions.
13. Identify offset press cylinder arrangements.
14. Identify the components of a conventional inking system.
15. Identify the components of a conventional dampening system.
16. Match components of the inking/dampening system with their functions.
17. Distinguish between the two types of dampening systems.
18. Identify the components of the delivery system.
19. Match components of the delivery system with their functions.
20. Match types of delivery systems with their descriptions.
21. Test the basic theory of offset printing. (Job Sheet 1)

Information Sheet

Objective 1

Terms and definitions

a. **Delivery**—The operation of an offset press in controlling the paper after the image is printed

b. **Fountain solution**—A chemical mixture applied to the nonimage areas of an offset plate to repel ink

c. **Infrared drying system**—Dries ink quickly by using extreme heat through infrared bulbs located above the delivery tray; can be dangerous due to fire hazards

d. **Ink**—A substance applied to the image areas of an offset plate for transfer to the blanket and then to the paper

e. **Offset**—In modern lithography, the procedure of transferring a right-reading image (plate cylinder) to an intermediate carrier (blanket cylinder) where it becomes wrong reading, then transferring that image to a receiver (paper stock) where it again becomes right reading

f. **Offset press**—A piece of printing equipment which holds a roll or stack of paper, controls that paper through the process of imprinting an image on its surface by the offset method, and delivers the paper to a stack or roll for further processing

g. **Offset printing**—The process of printing from a flat surface with the image and nonimage areas separated by ink/water chemistry

h. **Register**—To print the image in the exact same position on each sheet of paper

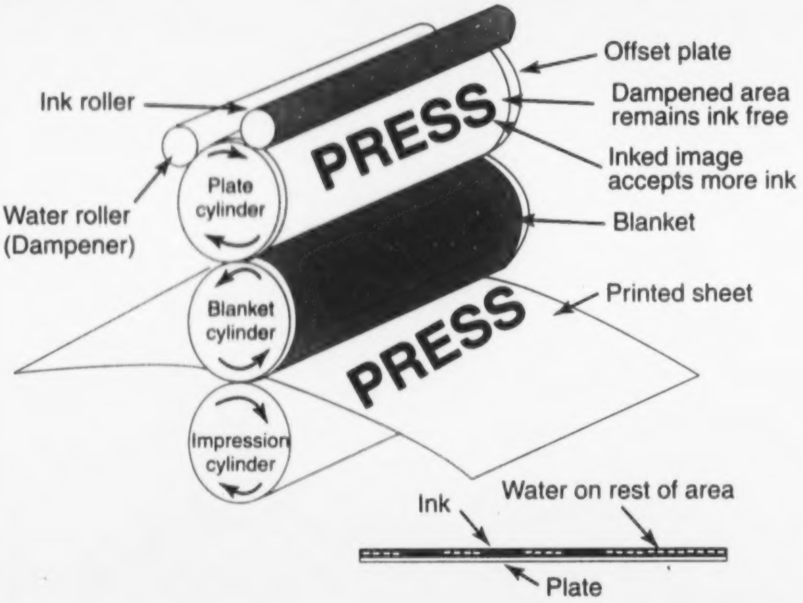
i. **Register board**—A flat surface on which the sheet of paper is positioned between the feeder and cylinder systems

j. **Vacuum**—Suction created through the sucker tube(s) by a vacuum pump intake

Objective 2

Basic theory of offset printing—The chemical principle that ink and water do not readily mix

Figure 1

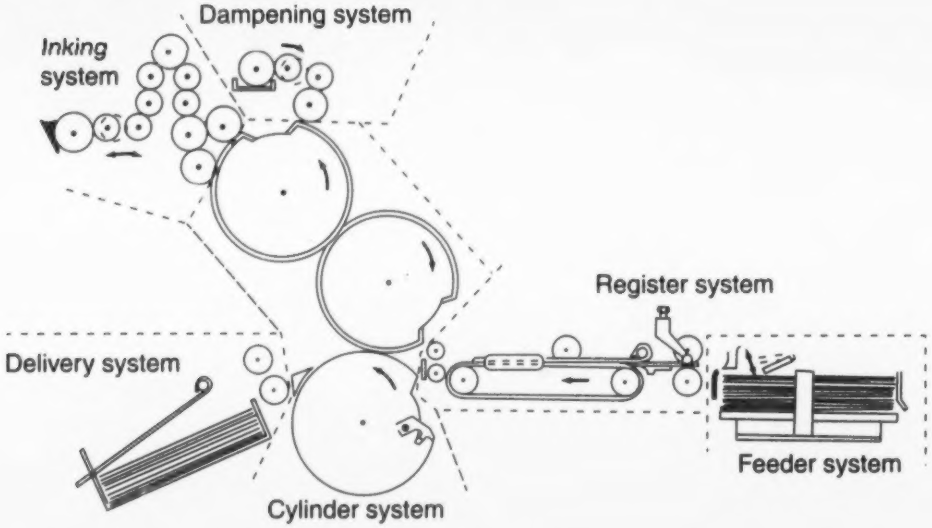

Offset plate
Ink roller
Dampened area remains ink free
PRESS
Inked image accepts more ink
Plate cylinder
Water roller (Dampener)
Blanket
Printed sheet
Blanket cylinder
PRESS
Impression cylinder
Ink
Water on rest of area
Plate

Note: If a completed offset plate is dampened evenly with water, the water will be repelled by the inked image—the water will actually run away. If ink is applied to the same plate, the inked image will accept more ink, but the dampened clear area of the plate will remain ink free. If, however, ink is applied to a completed offset plate not previously dampened with water, the entire surface will accept the ink.

Objective 3

Basic systems of a typical sheet fed offset press

Figure 2



Objective 4

Functions of the basic systems of a typical sheet fed offset press

a. Feeder system—Controls the feeding of paper stock either from a roll or as a single sheet from a stack

b. Register system—Controls the positioning of the paper being fed through the press so the image will print in the exact same position on each sheet

c. Cylinder system—A set of three cylinders (or their equivalent) which control the transfer of the image from the offset plate to the paper being fed through the press

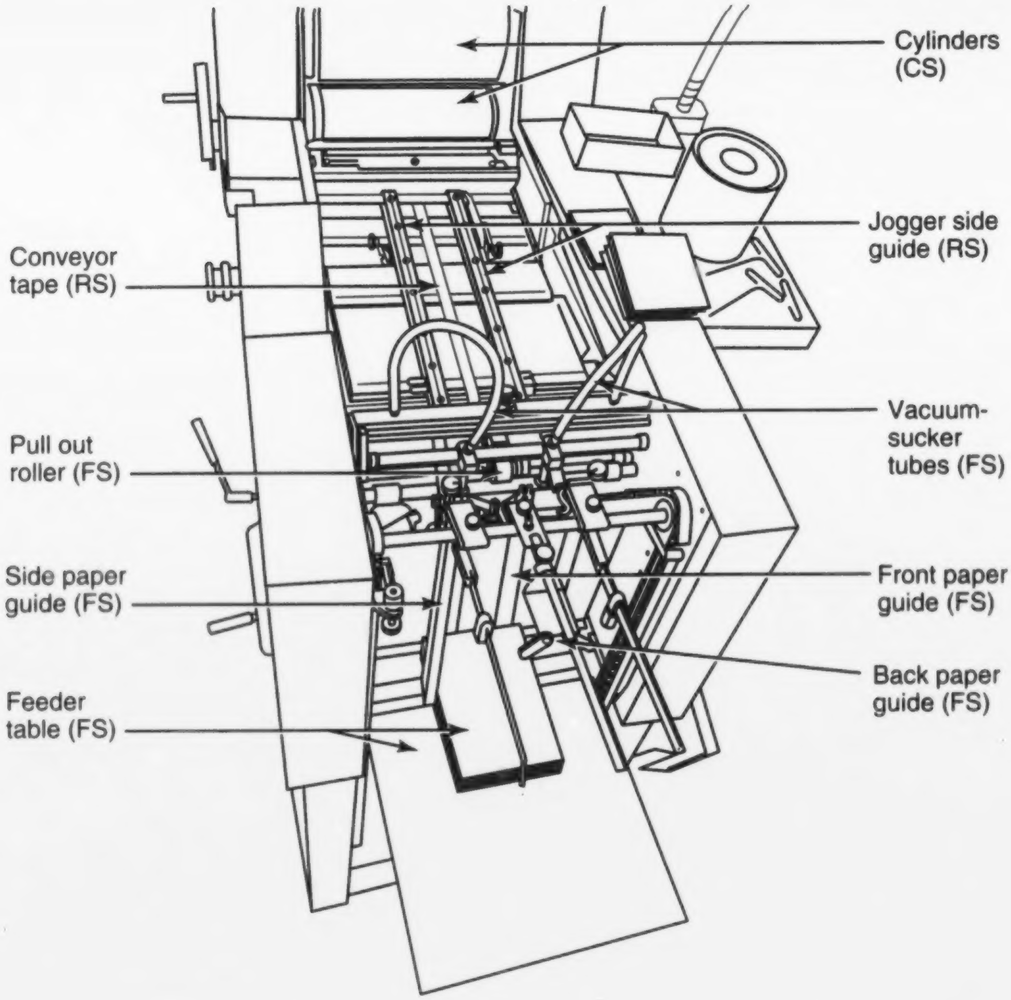
d. Inking system—A reservoir (fountain) of ink and related rollers which control ink distribution to the image areas of the offset plate

e. Dampening system—A reservoir (fountain) of dampening solution and related rollers which control dampening solution distribution to the nonimage areas of the offset plate

Note: Another name for the dampening system is *water system.*

f. Delivery system—Controls the paper after the image is printed by stacking to facilitate further processing

Figure 3


Cylinders (CS)
Jogger side guide (RS)
Conveyor tape (RS)
Vacuum-sucker tubes (FS)
Pull out roller (FS)
Side paper guide (FS)
Front paper guide (FS)
Back paper guide (FS)
Feeder table (FS)

FS – Feeder System
RS – Register System
CS – Cylinder System

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Objective 5

Components of the feeder system

Figure 4—Top view

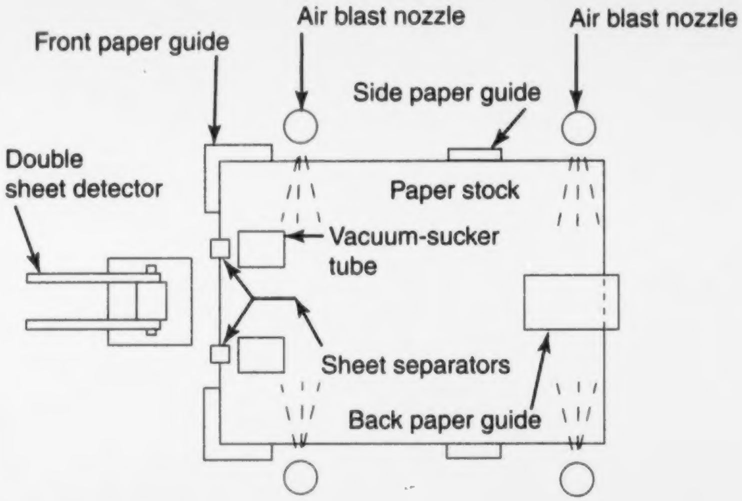
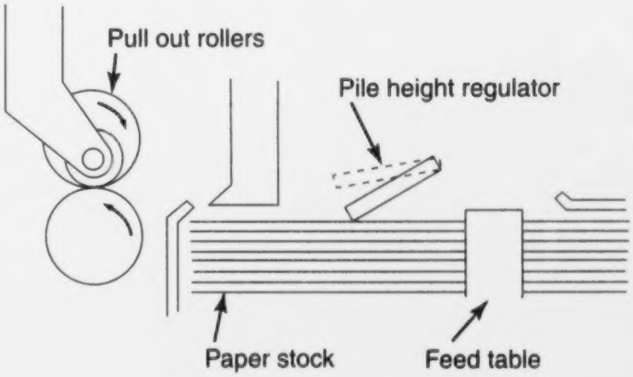

Air blast nozzle
Air blast nozzle
Front paper guide
Side paper guide
Double sheet detector
Paper stock
Vacuum-sucker tube
Sheet separators
Back paper guide

Figure 5—Side view


Pull out rollers
Pile height regulator
Paper stock
Feed table

Objective 6

Functions of components of the feeder system

a. Feed table—Holds a stack or pile of paper in position for feeding into the press

b. Paper guides (front, back, and side)—Position the sheets that are stacked on the feed table by holding the paper on the sides and at the leading and trailing edges in exact position for entering the press

c. Double sheet detector—A device which gauges the thickness of the paper before it is fed into the register system and provides a means of stopping or deflecting the paper if two or more sheets are picked up by the sucker tube(s)

d. Sheet separator—Small, thin, narrow, flexible metal finger which is positioned against the leading edge of the paper pile and has the tip end bent to fit over the top of the leading edge about $^1/_4$"; it aids in the feeding of one sheet at a time by separating top sheet from a second or more sheets, which remain on top of the pile

e. Vacuum-sucker tube—A moveable tube through which a vacuum pump draws air causing a sheet of paper to be drawn into contact with the tube, which then moves the sheet into the press

f. Air blast nozzle—Blows air from the discharge side of a vacuum pump through one or more tubes into the edges of the top few sheets of paper on the feed table to control sheet separation for pickup of a single sheet by the sucker tube(s)

g. Pull out roller—A free turning roller which rotates in contact with a gear driven roller to pull the sheet of paper from the sucker tube(s) and deliver it to the register system

h. Pile height regulator—A device which automatically controls the height at which the pile of paper will be maintained for continuous feeding into the press

Objective 7

Types of feeder systems and their operations

a. Sheet feed—Each sheet is picked up at the gripper edge after the trailing edge of the previous sheet moves past the sucker tubes.

Note: Small table top presses use a friction roller feed system.

b. Stream feed

- Each sheet is picked up at the trailing edge and pushed underneath the previous sheet.
- The next sheet can be picked up immediately as the trailing edge moves toward the register system.
- Several overlapping sheets will be in position on the register board at one time.

c. Roll or web feed—The paper is mounted as a roll on the feeder system and can be delivered from the press as single sheets or rewound as a roll.

Objective 8

Components of the register system

Figure 6—Side view

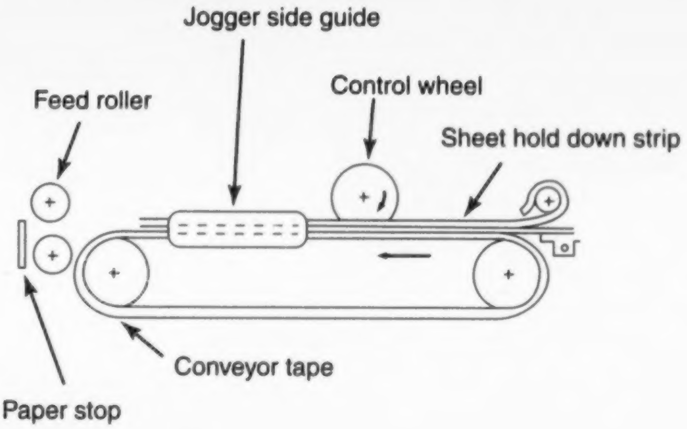
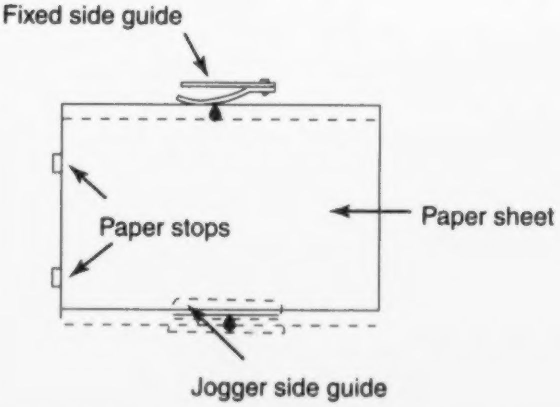

Jogger side guide
Feed roller
Control wheel
Sheet hold down strip
Conveyor tape
Paper stop

Figure 7—Top view


Fixed side guide
Paper stops
Paper sheet
Jogger side guide

Objective 9

Functions of components of the register system

a. Feed roller—A free turning roller which moves in and out of contact with a gear-driven roller during each revolution of the press to move the sheet of paper from its register board position into the cylinder grippers

b. Paper stops—A set of guides to stop the forward motion of the sheet of paper so it may be positioned by the side guides

Note: The paper stops are also called drop guides.

c. Conveyor tapes—A set of tapes or tracks which lie flat on the register board, and rotate around the board to move the paper through the register system

d. Jogger side guide—Positions paper to correctly enter feed roller; adjusts to width of paper

e. Sheet hold down strip—A thin, narrow flexible strip of metal the length of the register board which lies on top of a sheet of paper with a conveyor tape underneath to prevent sheet buckle

f. Control wheel—Adjusts the tension on the sheet hold down strip

g. Fixed side guide—Maintains paper in position to enter feed roller

Objective 10

Types of register systems

a. Register board

Note: The sheet is positioned by push or pull guides and on some models is delivered to the cylinder system by register swing grippers.

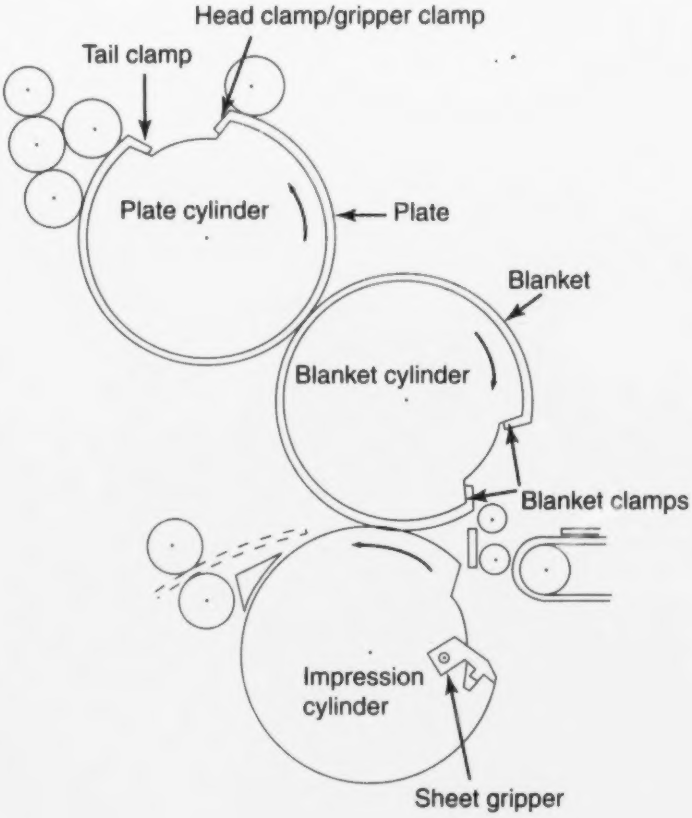
b. Feeder/buckle

Note: The register is controlled laterally by positioning the sheet on the feed table; vertically, the image register is controlled by adjusting the buckle caused by overfeeding of the sheet into the open cylinder grippers and holding that buckle until the grippers close.

Objective 11

Components of the cylinder system

Figure 8


Head clamp/gripper clamp
Tail clamp
Plate cylinder
Plate
Blanket
Blanket cylinder
Blanket clamps
Impression cylinder
Sheet gripper

Objective 12

Functions of components of the cylinder system

a. Plate cylinder—The part of an offset press which holds the offset plate

b. Tail clamp—The part of a plate cylinder which holds the trailing edge of the offset plate to secure its position on the cylinder

c. Head clamp/gripper clamp—The part of a plate cylinder which grips with pressure or holds the leading edge of the offset plate to secure its position on the cylinder

d. Plate—Metal image-bearing surface which, treated with dampening solution and ink, imparts a printing image to the blanket roller

e. Blanket clamps—The parts of the blanket cylinder which hold the blanket secure in position and around the cylinder

f. Blanket cylinder—The part of an offset press which contains a rubber blanket to receive the image from the plate

g. Blanket—A thick sheet of rubber laminated to a backing sheet (usually canvas) that fits on the surface of the blanket cylinder

h. Impression cylinder—The part of an offset press which applies pressure for image transfer to the paper

i. Sheet grippers—Several metal fingers attached to a shaft on the impression cylinder which grip the leading edge of the sheet of paper as it passes through the cylinder system

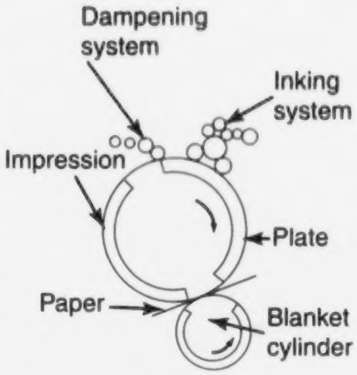
Objective 13

Offset press cylinder arrangements

Note: The cylinder systems of offset presses have different arrangements with 2, 3, 4, or more cylinders; the equivalents of the plate, blanket and impression cylinders are present in all arrangements.

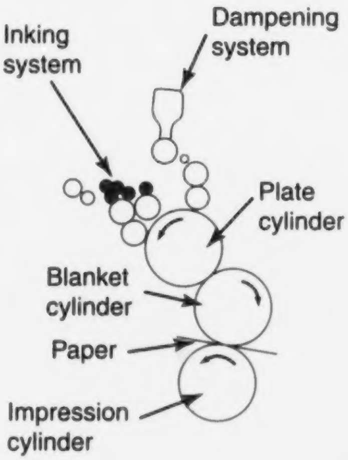
a. Two cylinder

Figure 9



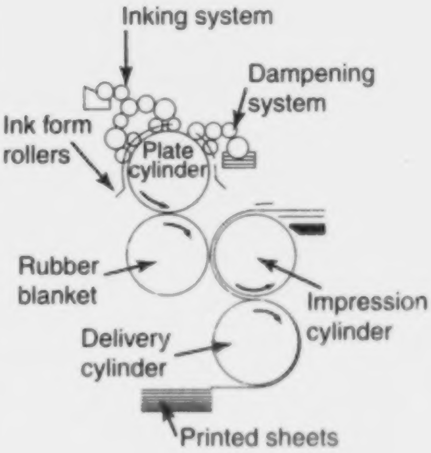
b. Three cylinder

Figure 10



c. Four cylinder

Figure 11


Inking system
Dampening system
Ink form rollers
Plate cylinder
Rubber blanket
Impression cylinder
Delivery cylinder
Printed sheets

d. Perfector (blanket to blanket)

Figure 12

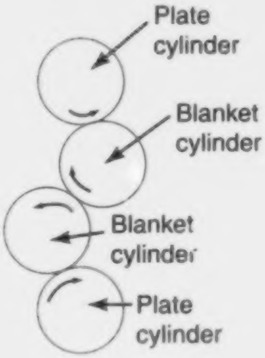


Plate cylinder
Blanket cylinder
Blanket cylinder
Plate cylinder

e. Two-color common impression cylinder

Figure 13

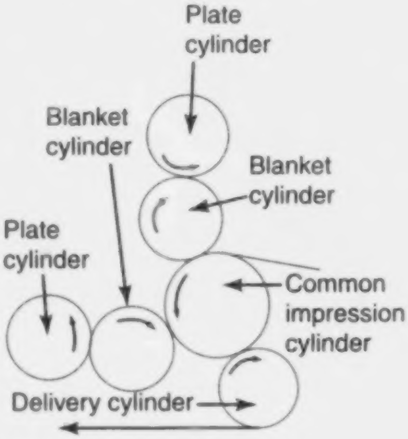
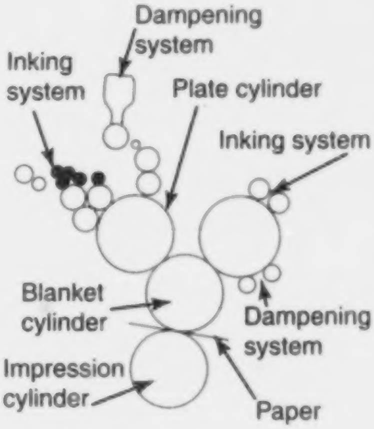


Plate cylinder
Blanket cylinder
Blanket cylinder
Plate cylinder
Common impression cylinder
Delivery cylinder

f. Two-color common blanket cylinder

Figure 14

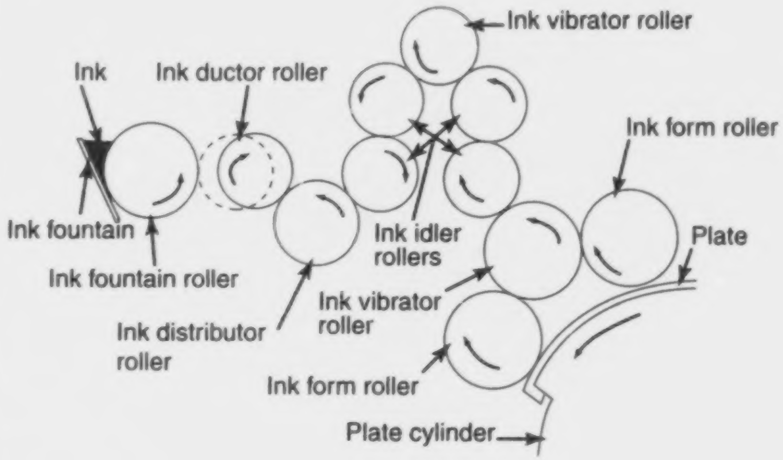

Dampening system
Inking system
Plate cylinder
Inking system
Blanket cylinder
Dampening system
Impression cylinder
Paper

246

Objective 14

Components of a conventional inking system

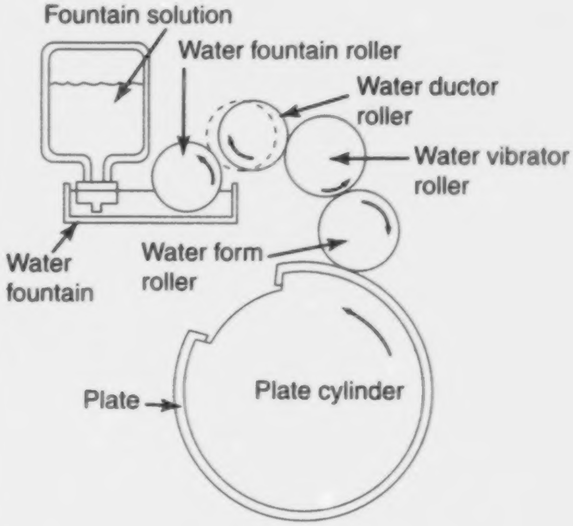
Figure 15


Ink vibrator roller
Ink
Ink ductor roller
Ink form roller
Ink fountain
Ink fountain roller
Ink idler rollers
Plate
Ink vibrator roller
Ink distributor roller
Ink form roller
Plate cylinder

Objective 15

Components of a conventional dampening system

Figure 16


Fountain solution
Water fountain roller
Water ductor roller
Water vibrator roller
Water fountain
Water form roller
Plate
Plate cylinder

Objective 16

Functions of components of the inking/dampening system

a. Fountain roller—The roller which rotates in the ink and water fountains respectively to distribute ink and water to each of the systems

b. Fountain—A tray reservoir which holds a supply of ink or water (fountain solution)

c. Ductor roller—The intermediate roller which carries ink or water from the respective fountain roller to each system

d. Distributor roller—Gear driven or free turning roller which rotates on its axis in contact with other rollers to aid in even distribution of water and ink in the respective systems

e. Idler roll—A free turning roller which contacts other ink rollers to aid in ink distribution

f. Vibrator roller—A hard surface free-turning (or powered) roller which moves back and forth on its axis while rotating in contact with other rollers in the ink or water system to evenly distribute the ink or water

Note: In various regions of the U.S., the vibrator roller is also called the *oscillating* or *waver roller.*

g. Form roller—The ink and/or dampening roller which makes contact with the offset plate while it is attached to the plate cylinder

Objective 17

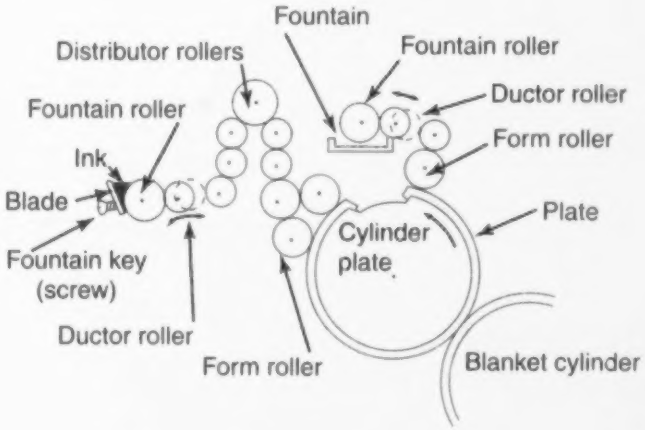
Types of dampening systems

Note: Different press manufacturers use detailed variations to accomplish dampening with these types of systems and call them by trade names such as Dahlgren, Harris-Cottrell, Micro-Flow, Didde-Glaser, A.B. Dick, Aquamatic, and others.

a. Conventional

- Separate ink and water fountains
- Separate ink and water form rollers contacting the plate
- Covered roller
    - Molleton
    - Parchment
    - Paper or cloth sleeve
- Noncovered roller (barebacks)

Figure 17—Conventional inking and dampening system (two inking system)

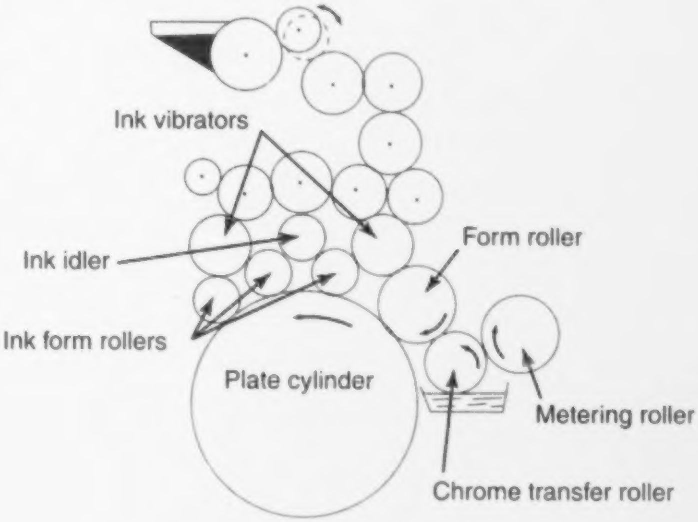

Fountain
Distributor rollers
Fountain roller
Fountain roller
Ductor roller
Ink
Form roller
Blade
Plate
Cylinder plate
Fountain key (screw)
Ductor roller
Form roller
Blanket cylinder

b. Integrated

Note: Various designs of integrated dampening systems may be encountered in the field depending upon the manufacturer of individual presses. Many appear considerably different in numbers and arrangements of rollers, but all share the following common traits. See Student Supplement 1.

- Separate ink and water fountains
- Common ink and water form roller(s) contacting the plate
- Noncovered rollers

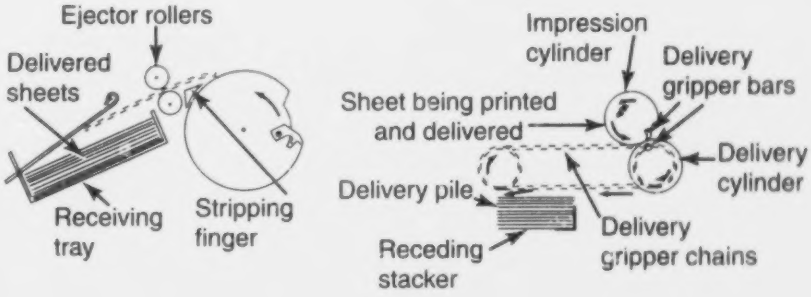
Figure 18—Integrated system


Ink vibrators
Form roller
Ink idler
Ink form rollers
Plate cylinder
Metering roller
Chrome transfer roller

Objective 18

Components of the delivery system

Figure 19


Ejector rollers
Delivered sheets
Receiving tray
Stripping finger
Impression cylinder
Delivery gripper bars
Sheet being printed and delivered
Delivery cylinder
Delivery pile
Receding stacker
Delivery gripper chains

Tray Delivery **Chain Delivery With Receding Stacker**

Objective 19

Functions of components of the delivery system

a. Ejector rollers—Rollers which aid in removing the sheet of paper from the impression cylinder and delivering it to the receiving unit

b. Receiving tray—A tray with positioning guides which receives the sheet from the cylinder system and holds the paper in a straight stack

Note: The quantity capacity of the tray is about 500 sheets of 20-pound bond.

c. Stripping finger—Metal finger which is positioned close to the surface of the impression cylinder which prevents the sheet of paper from following the cylinder rotation after the sheet is released to the delivery system

d. Delivery gripper bars—A set of gripper fingers mounted on two parallel chains which rotate to pick up the sheet of paper from the cylinder grippers and deliver it to a receiving tray or stacking unit

e. Delivery cylinder—Delivers sheet of paper to stack in receiving tray

f. Delivery gripper chains—Revolving chains with mounted gripper bars which transfer the sheet of paper from the cylinder system to a receiving table

g. Receding stacker—A receiving table attached to the offset press which automatically lowers as sheets of paper are delivered to it

Objective 20

Types of delivery systems and their descriptions

a. Tray—Paper is delivered to a receiving tray which must be emptied frequently

   Note: Tray delivery is also known as *chute delivery*.

b. Chute with receding stacker—Paper is delivered and positioned on a table which lowers automatically

c. Chain—Paper is delivered by gripper bars revolving on chains to a table which lowers automatically, allowing many sheets to be stacked

   Note: Some small presses with chain delivery systems do not have a receding stacker.

Student Supplement 1—Integrated Dampening Systems

As you study Objectives 14 and 15 in this unit, you will notice the inking system and dampening system are treated as separate systems and are illustrated as "stand alone" schematics. While these systems are, indeed, separate, in reality many offset press designs include shared rollers between the systems, in integrated dampening/inking systems, to save material and manufacturing costs.

So, although you will be studying the systems as separate—for the sake of convenience—compare the following illustrations of integrated systems. You will note they look quite different, however, their function is identical.

Figure 1

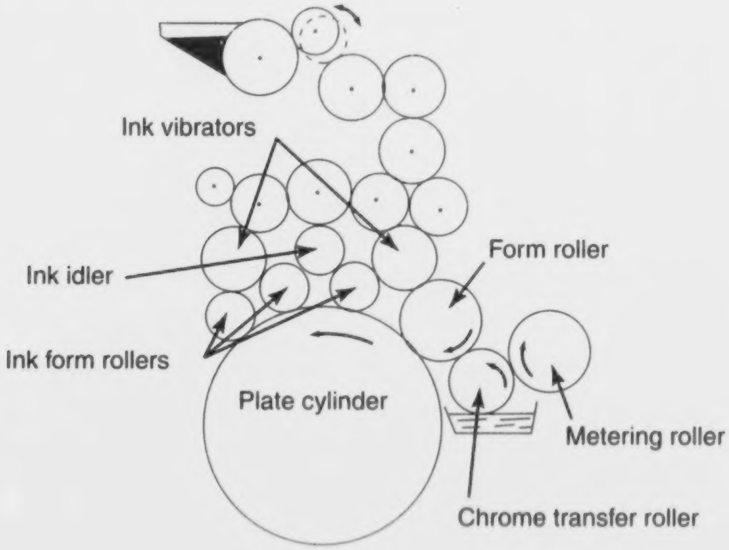
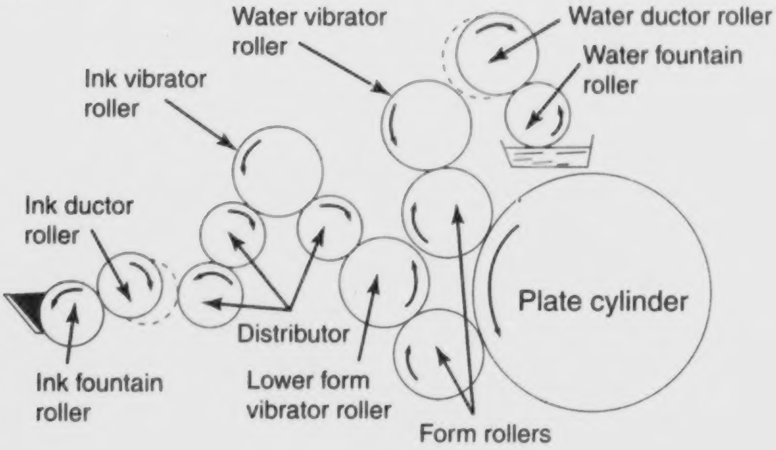

Ink vibrators
Form roller
Ink idler
Ink form rollers
Plate cylinder
Metering roller
Chrome transfer roller

Figure 2


Water vibrator roller
Water ductor roller
Water fountain roller
Ink vibrator roller
Ink ductor roller
Plate cylinder
Distributor
Ink fountain roller
Lower form vibrator roller
Form rollers

Objective 21

Job Sheet 1—Test the Basic Theory of Offset Printing

Name ______________________ Attempt Number ______

Date ______________________ Overall Rating ______

Evaluation Criteria	Rating
• Directions were followed	______
• Thoroughly dampened plate and spread layer of ink on the plate	______
• Noted what areas of plate accepted/rejected ink	______
• Cleaned and gummed plate	______
• Cleaned work area and placed tools and materials in storage	______
• Accurately reported results of the activity	______

Basic Skills

Reading Writing Science Critical Thinking

Introduction

The basis of offset printing is the repelling chemical reaction of water and ink. This exercise gives the student personal experience in seeing how ink and dampening solutions react on an exposed printing plate, and how that reaction results in a usable printing tool.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Developed offset plate
- Two cotton pads
- Small portion of offset press ink
- Container of fountain solution or water
- Clean-up solvents
- Preservatives

Procedure

☐ 1. Lay plate on table with image up.

☐ 2. Thoroughly dampen one cotton pad with fountain solution or water and thoroughly dampen entire surface of offset plate.

☐ 3. Dampen remaining cotton pad with ink.

☐ 4. Spread an even layer of ink across face of dampened offset plate.

☐ 5. Note what areas of plate accept the ink and what areas remain clear.

____

____

☐ 6. Clean and gum plate.

☐ 7. Clean work area and return tools and materials to proper storage area.

Report

Write a short report using the results of this activity and your knowledge from class notes, lectures, and resource materials.

☐ 1. Explain what took place when the ink was applied to the dampened offset plate.

☐ 2. Explain what might have happened if the ink had been applied to a dry plate.

☐ 3. On a printing job, what might be the result of a malfunctioning dampening system?

Evaluator's Comments: ______________________________

____

____

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Unit Contents

Student Components

Student Page

Objective Sheet 2–3

Information Sheet 2–5

Assignment Sheets

1—Conduct an Ink Cabinet Inventory 2–17
2—Conduct an Inventory of Offset Press Dampening Chemistry 2–19

Job Sheets

1—Mix Dampening Solution and Test for pH 2–21
2—Mix PMS Colors; Conduct and Evaluate an Ink Draw-Down or Smear 2–23
3—Mix Two Colors of Ink to Produce a Third Color 2–25

Objective Sheet

Unit Objective

After completing this unit, the student should be able to select ink and mix PMS ink colors for an offset sheet fed press. The student should demonstrate these competencies by completing the assignment sheets and job sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to offset inks and dampening solutions with their definitions.
2. Select true statements concerning the main ingredients of offset inks.
3. Name three ink manufacturing procedures which benefit the user.
4. Match types of ink with their descriptions.
5. List three conditions influencing the printing performance of offset inks.
6. Name three ink properties which affect the printing quality of offset inks.
7. Select rules for ink care, storage, and disposal.
8. State the purpose of offset dampening solutions.
9. Match dampening solution ingredients with their functions.
10. Name the two methods of measuring pH.
11. State the generally acceptable range of pH for a fountain solution.
12. Select the effects of using alcohol or alcohol substitutes in a fountain solution.
13. Discuss the importance of ink-water balance.
14. Select true statements concerning the characteristics of waterless printing.
15. Conduct an ink cabinet inventory. (Assignment Sheet 1)
16. Conduct an inventory of offset press dampening chemistry. (Assignment Sheet 2)
17. Mix dampening solution and test for pH. (Job Sheet 1)
18. Mix PMS colors; conduct and evaluate an ink draw-down or smear. (Job Sheet 2)
19. Mix two colors of ink to produce a third color. (Job Sheet 3)

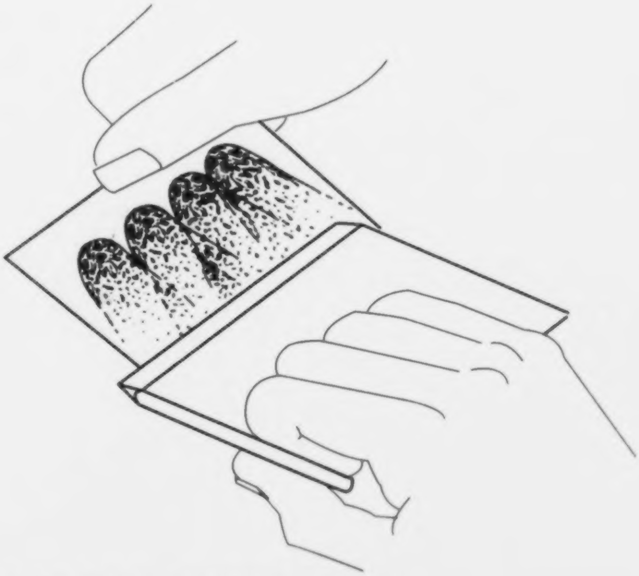
Information Sheet

Objective 1

Terms and definitions

a. **Draw-down**—A test procedure by which two or more small quantities of ink are placed on a test sheet of paper and spread uniformly with an ink knife or spatula in parallel stripes to determine color strength, opacity, and general appearance

Figure 1



Courtesy of Graphic Arts Technical Foundation

b. **Drier**—Any substance added to ink to speed drying

c. **Extender**—A colorless substance mixed with ink to increase its covering power

d. **Fugitive**—A tendency to lose color or fade when exposed to sunlight for long periods

e. **Lakes**—Ink body colors which are not particularly strong

f. **Length**—Ability of ink to flow and form long or short filaments

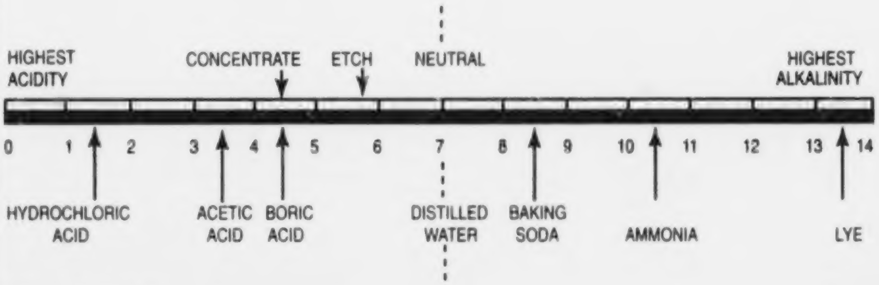
g. **Metallic inks**—Inks containing finely ground metallic powder, such as aluminum and bronze, which are used to provide silver and gold colors

h. **Opacity**—The hiding or covering quality of ink

i. **Permanence (fastness)**—A property of nonfading regardless of exposure to strong light or passage of time

j. **pH**—A symbol for the strength of acid or alkali in any solution, represented on a scale from 0–14 with 7 as neutral, 0 as acid, and 14 as alkaline

Figure 2


HIGHEST ACIDITY
CONCENTRATE
ETCH
NEUTRAL
HIGHEST ALKALINITY
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
HYDROCHLORIC ACID
ACETIC ACID
BORIC ACID
DISTILLED WATER
BAKING SODA
AMMONIA
LYE

©1999 A.B. Dick Company

k. **Pigments**—The coloring materials in ink

l. **PMS (Pantone Matching System)**—A standardized, nearly universally accepted matching system for mixing inks to produce given colors

m. **Relative humidity**—The amount of water vapor in the air compared to the greatest amount possible at the same temperature

n. **Resin**—Natural organic substance from plants which is not soluble in water

o. **Resistant**—Manufactured to withstand the action of such factors as gases, chemicals, heat, and moisture

p. **Tack**—The stickiness of the ink

q. **Toners**—Strong ink body colors with highly concentrated pigments

r. **Translucence**—The varying quality of an ink between opacity and transparency

s. **Transparency**—The characteristic of an ink that allows images beneath it to show through

t. **Varnish**—A thin, protective coating which is printed like ink on the paper stock; also used as an additive to vary ink properties

u. **Vehicle**—The bulk of the body of an ink

v. **Viscosity**—The resistance of ink to flow

Objective 2

Main ingredients of offset inks

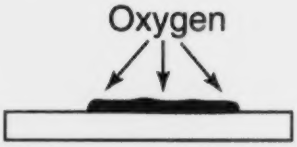
a. Vehicle—Forms the bulk of the body of ink; carries the pigment and binds the ink to the material being printed

- Types of vehicles
  - Varnish (linseed oil)
  - Synthetic oils (dehydrated castor oil, epoxy oil, and alkyd oil)
  - Resins
  - Solvents (petroleum or vegetable oil-based compounds)
- Factors determining vehicle selection
  - Purpose of ink
  - Printing process being used
  - Kind of paper
  - Methods of ink drying
    - Absorption—Nondrying oils penetrate the paper and dry as they are absorbed.

      Figure 3

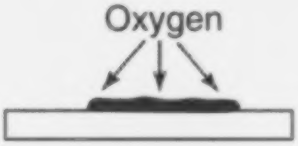
    - Oxidation—The vehicle absorbs oxygen from the air and becomes solid.

      Figure 4

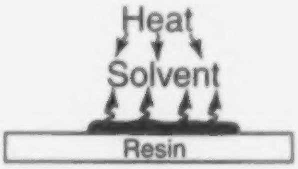
- Polymerization—Oxygen sets up a reaction that causes molecules to form a gel, then large molecular chains that harden.

Figure 5



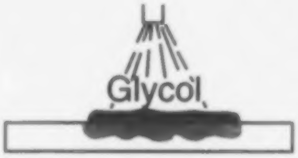
- Resin-solvent (evaporation)—The combination resin-solvent vehicle releases the solvent causing the resin to dry; process can be speeded by heating.

Figure 6



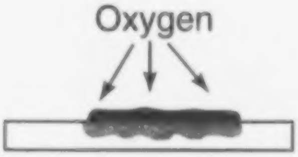
- Moisture-set (precipitation)—A glycol-resin vehicle is sprayed with water or steam; glycol mixes with water and is absorbed by the paper and the resin precipitates as a solid film.

Figure 7



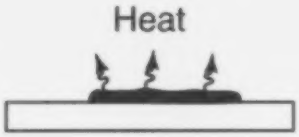
- Resin-oil (absorption and oxidation)—A combination of absorption and oxidation provides quick setting.

Figure 8



- Coldset (cooling)—A wax and resin vehicle is heated, then becomes solid as heat is radiated away from the vehicle as it cools.

Figure 9



b. Pigments—The coloring materials

- Black pigments are primarily carbon produced by burning petroleum products.
- White pigments
  - Opaque white are used as colorants.
  - Transparent white are used as extenders.
- Colored pigments are mostly synthetic; produced by processing chemicals to make dyes.

  Note: Colors that fade in sunlight are called fugitive. Colors that resist fading are said to have permanence. Colors that withstand the action of gases, chemicals, heat, and moisture are called resistant.

c. Modifiers—Driers, waxes, lubricants, gums, starches, extenders, varnishes and/or wetting agents which affect the drying of ink

Note: Small amounts of one or more modifiers may be added by a press operator in order for the ink to work and dry properly under existing production conditions. Compounds (and their use) for this purpose should be recommended by the manufacturer of specific ink, however.

- Greases aid in ink setting and ink lubrication.
- Thin oils and solvents reduce tack.
- Wetting agents help the vehicle to cover the pigment particles.
- Antioxidants slow surface drying.
- Deodorants eliminate odors of oils and driers.
- Perfumes impart fragrance to ink.

Objective 3

Ink manufacturing procedures which benefit the user

Note: Inks are manufactured with specific characteristics for each printing process. Offset inks are made specifically for use on offset presses. These inks must withstand constant contact with dampening solution without emulsifying (breaking down in water); thus, letterpress inks should never be used on an offset press.

a. Ink is mixed in batches and carefully weighed.

   Note: The mixing equipment is cleaned thoroughly after each batch and the process begins all over again. Records are kept on lists of ingredients and batch numbers. Any problem with ink at the press can be solved more quickly by the manufacturer if the batch number is known. Many times in troubleshooting, a press problem may be distinguished from an ink problem by use of ink from a different batch.

b. Ink is tested at the factory under actual printing conditions.

c. Packaging varies for convenient use and storage.

   Note: Ink is sold and stored in tubes, cans, drums, tank trucks, and railroad tank cars.

Objective 4

Types of ink

a. Heat-set inks—Used on high speed presses with heating devices

b. Quick-set inks—Dry by penetration and oxidation

c. Gloss inks—Exhibit minimum penetration into paper surface

d. News inks—Dry by absorption on high speed presses

e. Metallic inks—Contain metal powders suspended in a vehicle

f. Magnetic inks—Contain iron-bearing pigments which can be magnetized

g. Process inks—Have special colors (magenta, cyan, yellow), transparency, and drying characteristics

   Note: In four-color press work, inks and their drying characteristics have to be selected on the basis of the order in which they are placed on the paper.

h. Rubber-base inks—Dry quickly on most stock, but dry slowly on ink rollers

i. UV coatable inks—Do not contain wax

   Note: Due to the heat that is involved with UV coating, inks that contain wax cannot be produced with jobs that will UV coat. The wax in the ink will not let the coating adhere to the sheet.

j. Soy inks—Contain varying amounts of soybean oil instead of petroleum oil; environmentally friendlier than other inks because it contains low amounts of volatile organic compounds (VOCs); de-inks faster and cleaner from recyclable paper; can be used on virtually any lithographic press with no modifications or special cleaning agents.

   Note: Soybean oil's boiling point is much greater than petroleum oil's. This higher boiling point means the oil does not volatilize when exposed to the heat of a laser printer or copy machine. Soy ink sticks to the paper instead of being transferred to printer and/or copier parts.

k. Varnish—Protective coating applied over the printing; available in gloss or dull finishes; both types can be used on the image or nonimage areas.

   Example: When printing a four-color process picture on a cover of a brochure, gloss varnish can be printed on the picture and dull varnish may be used for the nonimage areas.

l. Aqueous coating—Water-based product that is applied with a special coating unit; available in gloss or dull finishes; can be applied to the whole sheet or in "spots."

Objective 5

Conditions influencing the printing performance of offset inks

a. Type of press being used

b. Speed of press

c. Stock surface being printed

Objective 6

Ink properties which affect the printing quality of offset inks

a. Color (pigments)

   Note: Mass-tone refers to ink color, undertone is the background color, tinting strength is the color intensity, and opacity or transparency is the ability to cover. Since inks are never completely opaque or transparent, they appear in varying degrees of translucency.

b. Body (consistency, viscosity)

c. Ability to dry (absorption, evaporation, oxidation)

Objective 7

Rules for ink care, storage, and disposal

a. Do not reuse ink after removal from ink fountain.

b. Keep ink surface level when removing ink from can.

c. Keep covers on all containers when not in use.

d. Store inks in enclosed metal cabinet away from excessive temperatures and light.

e. Keep outside surfaces of cans and tubes free of ink spills, smears, and stains.

f. Observe shelf life recommendations of manufacturer.

Note: Mixing colors of inks requires special tools and attention if colors are to be specific and repeatable. The Pantone Matching System (PMS) is nearly universally accepted and achieves these goals. To mix ink at the press with any predictability and without a mixing system requires some knowledge of the results of mixing primary colors to achieve another color or get a lighter or darker shade or tint. For best results only ink manufactured for mixing should be used. Generally, stronger colors (toners) should be added to weaker colors (lakes). Mixing should be done on a hard, smooth surface using an ink knife or spatula to blend colors.

g. Disposing of ink is an important issue for printers. Many print shops recycle their ink by mixing black ink with unused color inks. This process reduces waste and results in a more cost-effective, efficient use of ink.

Objective 8

The purpose of offset dampening solutions—To keep the nonimage area of a well-processed offset plate clean

Objective 9

Dampening solution ingredients and their functions

a. Water—The main ingredient which provides the moisture to keep the nonimage areas clean

Note: The desensitized film which holds water on the nonimage areas of the plate usually breaks down or wears off gradually. Water alone will not rebuild the desensitized film, so chemicals are added to the water.

b. Gum—The main desensitizing agent in the fountain solution; absorbed to the nonimage areas where it replaces the water-holding desensitized film worn off the plate during the press run

Note: The gum is usually gum arabic or cellulose gum.

c. Acid—Improves the adherence of the gum to the nonimage area of the plate

Note: Generally a pH between 4.0 and 5.0 is satisfactory. Increasing the acid does not keep the nonprinting area clean, but it tends to break down color of ink, causes ink to emulsify, causes ink roller stripping, retards ink drying, and reduces the life of the plate image.

d. Chemical salts (ammonium dichromate)—Keep the acid in the fountain solution from reacting chemically with the metal of the plate and prevents stripping of the metal ink rollers

e. Buffers (nitrate salts)—Stabilize the pH of a fountain solution

Note: It is important that the solution contain the *minimum* amount of gum and acid needed to keep the plate running clean.

f. Premixed solutions—Fountain solution chemicals premixed and packaged by manufacturers for specific presses and printing projects

Note: Consult your press operator's manual before purchasing or using these products.

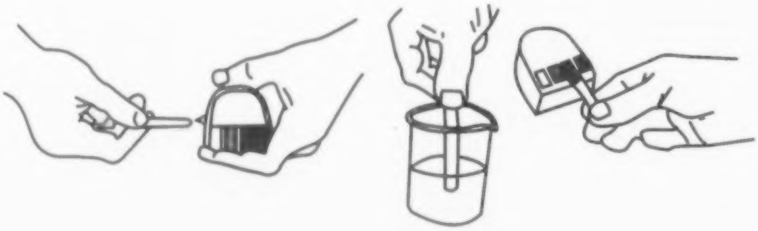
Objective 10

Methods of measuring pH (acidity or alkalinity)

a. pH paper test strips

Note: Test strips are impregnated with organic chemical compounds which change color when immersed in a solution. The color change is compared with a pH color chart which gives the pH value. These strips and color charts are available from a number of manufacturers.

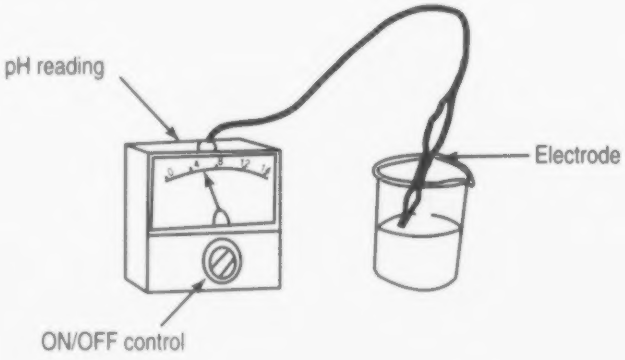
Figure 10



b. Electronic pH meter

Note: An electronic meter gives a pH reading by a pointer on a scale or by a digital readout when the electrode is immersed in a solution.

Figure 11



Information Sheet

Objective 11

Generally acceptable pH range for a fountain solution—Depends on the ink and paper being used; generally, a solution with a pH between 4.0 and 5.0 is satisfactory

Note: Check pH of the fountain solution periodically.

Objective 12

Effects of using alcohol or alcohol substitutes in a fountain solution

Note: Although many manuals and press operators continue to concern themselves with isopropyl alcohol in fountain solutions, the industry is rapidly moving away from its use because of increasingly stringent rules and regulations from the Occupational Safety and Health Administration and other government agencies. Because of the movement of the industry to alcohol substitutes, this manual will address itself to such preparations' effects on fountain solutions, but the student is advised to be aware of the fact that alcohol is disappearing from the press room.

a. Thinner film of solution on plate

b. Less solution on plate

- Less dimensional change in sheet
- Ink drying usually faster

c. Reduces droplet formation in ink

Note: "Snowflaky" problems are minimized.

d. Better definition between printing and nonprinting areas

e. Balanced ink-water running condition achieved more rapidly

Objective 13

Importance of ink-water balance

a. Key to quality printing

b. The basic rule for proper adjustment of ink-water balance is to run the minimum amount of ink which will give full color to the job and the minimum amount of water to keep the plate clean

Note: Water and ink balance through a press run is one of the most important skills a press operator can possess. The proper knowledge and ability in this area will overcome the temptation to resort to fountain solution additives, excessive spray powder on the delivery system, etc., to produce quality results.

c. Should be controlled to meet the needs of the plate

d. Proper control demands accurate analysis of problems as they occur

Note: Some symptoms at first appear the same even though they come from different causes. If the operator is knowledgeable enough to maintain the proper ink-water balance, troubleshooting can begin outside the ink and dampening system.

e. Excessive water causes problems

- Water collecting at trailing edge of plate or blanket
- Wash marks in solids extending back from the leading edge of a plate
- "Snowflaky" printing
- Emulsification of ink and water on roller plate or blanket

f. Insufficient water causes problems

- Closing up of shadow dots in halftones (plugging)
- Depositing of ink in nonimage areas of plate (catch-up or scumming)

Objective 14

Characteristics of waterless printing

a. An offset lithographic printing process that eliminates the water or dampening system used in conventional printing

b. Requires a special silicone rubber coated printing plate, special ink, and a means of temperature control on press

c. Process of printing is changed from a chemical process to a simplified mechanical process

Objective 15

Assignment Sheet 1—Conduct an Ink Cabinet Inventory

Name ______________________ Overall Rating __________

Date ______________________

Evaluation Criteria	Rating
• Student followed directions	______
• Student provided list of inks and additives in the storage area, complete with brand names and colors	______

Basic Skills

Reading Writing Mathematics

Introduction

A knowledge of what inks and additives are available is mandatory for printers meeting demands of customers. This exercise gives the student experience in conducting an inventory of the school shop ink cabinet.

Directions

Make an inventory list of all inks and additives in the ink storage area of your school print shop.

1. Divide the list by name brands.
2. Divide the name brand lists by color.
3. List ink additives separately.
4. To the right of each additive listed, describe its use (see instructor if necessary).
5. Turn in results to your instructor.

Objective 16

Assignment Sheet 2—Conduct an Inventory of Offset Press Dampening Chemistry

Name ______________________________ Overall Rating __________

Date ______________________________

Evaluation Criteria	**Rating**
• Student followed directions	______
• Student provided list of all chemicals used to prepare fountain solution in the shop	______

Basic Skills

Reading Writing Mathematics

Introduction

This exercise gives the student experience in conducting an inventory of the school print shop for chemicals used to prepare fountain solutions for shop presses.

Directions

Make an inventory list of all chemicals used to prepare fountain solution for all presses in the shop.

1. To the right of each chemical name, write the purpose of the chemical.
2. List the different mixing ratios used for each chemical for each type of plate (silver master, electrostatic, aluminum, etc.). See your instructor if necessary.

   Examples: 1:30, 1:15, 1:7

3. Turn in results to your instructor.

Objective 17

Job Sheet 1—Mix Dampening Solution and Test for pH

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Student followed directions	______
• Fountain solution properly mixed	______
• pH value determined and accurately noted	______

Basic Skills

Reading

Critical Thinking

Introduction

The basis of offset printing is the repelling chemical reaction of water and ink. This exercise gives the student personal experience in mixing a properly pH balanced fountain solution for use on the school press.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Premixed fountain solution ingredients and containers for mixing (provided by instructor)
- Distilled or deionized water (provided by instructor)
- pH testing strips or electronic pH meter
- Mixing containers and tools
- Paper to record results
- Pencil or pen

Procedure

☐ 1. Mix fountain solution ingredients and distilled or deionized water according to manufacturer's or instructor's directions.

☐ 2. Insert test strips (Figure 1) or meter electrode (Figure 2) into mixed solution.

Figure 1

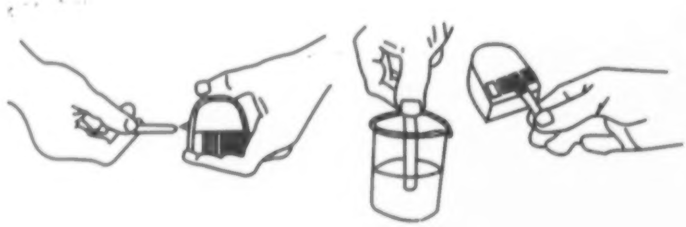
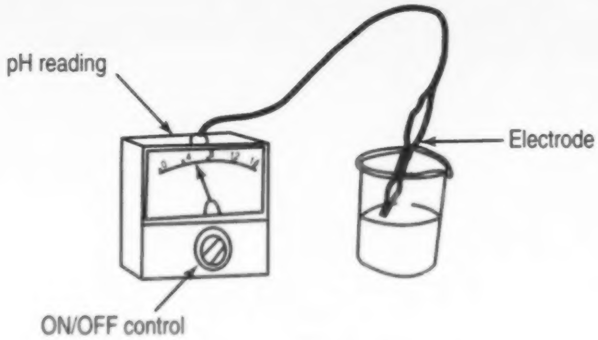


Figure 2


pH reading
Electrode
ON/OFF control

☐ 3. Determine pH by comparing the test strips to pH chart or reading meter.

☐ 4. Record the pH value.

☐ 5. Turn in results to your instructor.

☐ 6. Clean containers, mixing area, and tools.

Evaluator's Comments: ____

____

____

Objective 18

Job Sheet 2—Mix PMS Colors; Conduct and Evaluate an Ink Draw-Down or Smear

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

Evaluation Criteria	Rating
• Student followed directions	______
• Correct ink samples accurately weighed and blended	______
• Samples carefully placed and draw-down completed in one stroke	______
• Sample colors compared to factory sample	______

Basic Skills

Reading

Critical Thinking

Introduction

This exercise gives the student experience in accurately blending inks to match a desired color.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

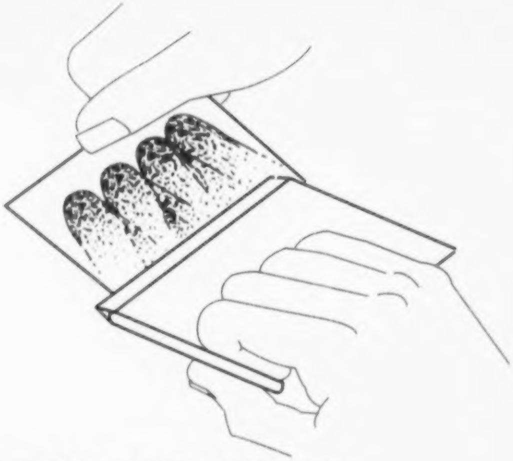
- PMS color formula guide
- Sufficient quantities of Pantone Yellow C basic color ink, Pantone Transparent White ink, and Pantone 101C ink for activity (provided by instructor)
- Draw-down paper strips with opaque strip (provided by instructor)
- Ink knife or spatula
- Mixing containers
- Ink scale
- Pencil or pen

Procedure

☐ 1. Weigh proper quantities of Pantone Yellow C and Pantone Transparent White ink (according to weight measures of scale and color formula guide ratios for Pantone 101C) and mix thoroughly (to the satisfaction of the instructor).

☐ 2. Using spatula or ink knife, deposit a small quantity of Pantone 101C near the top of a draw-down strip (Figure 1).

Figure 1



Courtesy of Graphic Arts Technical Foundation.

☐ 3. Clean the tool thoroughly.

☐ 4. Using the same technique, deposit a like-size quantity of the mixture of Pantone Yellow C and Pantone Transparent White ink adjacent to the Pantone 101C sample on the draw-down strip.

☐ 5. Clean the tool thoroughly.

☐ 6. Using the spatula or ink knife, in one stroke, draw both samples down across the opaque strip of the draw-down sheet until the ink is dissipated.

☐ 7. Compare the factory-produced 101C with the classroom mixed example of 101C for color strength, opacity, and general appearance on the paper surface of the draw-down strip.

☐ 8. Sign name to draw-down sheet and turn in completed project to instructor.

☐ 9. Clean containers, mixing area, and tools.

Evaluator's Comments: ______________________________

____

____

Objective 19

Job Sheet 3—Mix Two Colors of Ink to Produce a Third Color

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Student followed directions	______
• Pantone Yellow C and Pantone Process Blue C inks accurately weighed and mixed	______
• Draw-down completed and compared to Pantone 368C	______

Basic Skills

Reading

Critical Thinking

Introduction

This exercise gives the student experience in accurately blending inks to match a desired color.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- PMS color formula guide
- Sufficient quantities of Pantone Yellow C ink and Pantone Process Blue C ink for activity (provided by instructor)
- Ink knife or spatula
- Mixing containers and tools
- Draw-down paper strips
- Ink scale

Procedure

☐ 1. Weigh proper quantities of Pantone Yellow C ink and Pantone Process Blue C ink (according to weight measure of scale and color formula guide ratios for Pantone 368C–a green).

☐ 2. Using mixing tools, mix the two inks thoroughly (to the instructor's satisfaction).

☐ 3. Conduct an ink draw-down with the mixture.

☐ 4. Compare the results with the example of Pantone 368C in the color formula guide.

☐ 5. Discuss results with your instructor.

☐ 6. Clean mixing area, containers, and tools.

Evaluator's Comments: ______________________________

____

____

Unit 3

Offset Press Operating Procedures

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Objective Sheet

Unit Objective

After completing this unit, the student should be able to set up sheet and image control systems of an offset press and print a number of printing assignments. The student should demonstrate these competencies by completing the assignment sheet and job sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to offset press operating procedures with their definitions.
2. Select true statements concerning essential safety precautions.
3. List two reasons why efficient press operation is important.
4. Select offset press operator control functions.
5. Match typical operator control features with the press systems in which they are located.
6. Arrange in order steps in the sequence of paper movement through a typical offset press.
7. Compare control features of offset and digital presses. (Assignment Sheet 1)
8. Set up the sheet control systems. (Job Sheet 1)
9. Set up the image control systems. (Job Sheet 2)
10. Operate an offset press from setup of systems through printed sheet delivery. (Job Sheet 3)
11. Rule up a sheet. (Job Sheet 4)
12. Perform a color wash on an offset press. (Job Sheet 5)
13. Print envelopes. (Job Sheet 6)
14. Change press from envelopes to letterhead. (Job Sheet 7)
15. Print a two-color, two-sided job. (Job Sheet 8)
16. Print a two-color duotone using an additional color head. (Job Sheet 9)
17. Print a work-and-turn. (Job Sheet 10)
18. Print a work-and-tumble. (Job Sheet 11)

Objective Sheet

19. Print halftones and screen tints. (Job Sheet 12)
20. Print solids. (Job Sheet 13)
21. Print using photodirect and/or electrostatic masters. (Job Sheet 14)
22. Print a four-color process job. (Job Sheet 15)
23. Perform perforation and scoring. (Job Sheet 16)

Information Sheet

Note: This unit is developed on the premise that all types of offset presses possess the same basic systems which serve the same basic functions, have the same basic controls, and produce the same basic end product; therefore, the basic operation procedures are similar for all types of offset presses.

Objective 1

Terms and definitions

a. **Blanket wash**—A petroleum base solvent prepared for washing rubber offset blankets and rollers; used for general press clean up

b. **Color bar**—A series of ink patches printed on a press sheet that include solid patches of the ink and 25%, 50%, and 75% screen tints of those colors. Press operators measure these patches to determine the density values of the solids and dot gain values in the screen tint patches. Some color bars include special patches to check for other effects such as slurring and doubling.

c. **Dot gain**—Indicates how much the dots of ink have spread in the paper in relation to the original dot size on the film

d. **Etch**—A solution that conditions the nonimage area of an offset plate to make it more water receptive

e. **Feed table extensions**—Movable metal plates which attach at right angles to the feed table surface to extend its height and allow open space to accommodate the side and back paper guides when the feed table is at top position

f. **Handwheel**—A wheel on the operator's side of a press which allows the operator to turn the press through its cycle by hand

g. **Makeready**—Process that press operator goes through in setting up the press for a press run. The operator runs about 25 sheets in a set to check the squareness and position on these sheets. If a densitometer is being used the press operator will check the density of the ink and make adjustments.

h. **Night latch**—A position of slight separation of the rollers in the ink and dampening systems used when the press is not operated for a period of time to prevent flat stripes from forming on roller surfaces

i. **Paper bail**—A thin, narrow, long metal strip attached to the delivery system which aids in controlling the delivery of a sheet to the receiving tray

j. **Picking**—A condition caused by wet ink from the image transferring to the impression cylinder when printing a two-sided job

k. **Rule-up (rule-out)**—Process that press operator goes through if the job ticket indicates that sheets are going to be cut, folded, or bound. Ensures that the size and bleed amounts of the printed press sheet coincide with the job finishing instructions.

l. **Setoff**—A condition caused by wet ink from the image on the surface of one sheet rubbing off onto the next sheet in contact with the image

m. **Sheetwise**—To print one side of the paper with one plate, then turn the sheet over and print the other side with another plate using the same gripper and side guide

Objective 2

Essential safety precautions

a. Tie back long hair.

b. Avoid or bind up loose clothing.

c. If wearing a long-sleeved shirt, roll up the sleeves before operating a press.

d. Remove jewelry such as bracelets, watches, rings, and necklaces before operating a press.

e. Keep dust cover and safety guards in place for operation.

f. Stop the press when:

- Using tools for adjustments.

  Note: Always remove tools from press.

- Making hand adjustments on moving parts.
- Wiping or cleaning with a rag.
- Lubricating any part.
- Clearing paper jams.
- Leaving press area.

g. Limit use of press to one designated operator at any one time.

h. Receive specific permission or assignment before press is operated.

i. Fold rags for cleaning rather than wadding in hand.

j. Place dirty rags in a metal container.

k. Read operator's manual before operating press.

l. If any parts or guards are broken or missing, lock and tag out the press and inform instructor immediately.

m. Keep press work area free of trash and clutter.

n. Inspect and turn press with the handwheel at least one revolution before starting drive motor.

o. Make sure electrical connections are in full contact and free of frayed or broken insulation.

p. Ventilate fumes from the press area.

q. Store flammable liquids in designated, protected area.

Objective 3

Reasons why efficient press operation is important

a. No income is received unless printed sheets are delivered from the press.

b. Reduced profit potential results from inefficient use of time, equipment, and materials.

Objective 4

Offset press operator control functions

a. Control paper
  - Feed
  - Register
  - Deliver

b. Control ink to plate image area

c. Control dampening solution to plate nonimage area

d. Control image transfer quality
  - Plate to blanket
  - Blanket to paper

e. Control press wash-up

f. Maintain safe and orderly work area

g. Complete job order records for press operation

Objective 5

Typical operator control features of offset press systems

a. Feeder system
  - Feed table raise/lower crank
  - Paper feed guides

  - Stack height regulator
  - Vacuum control
  - Air blast (blower) control
  - Sheet separators
  - Pull-out roller pressure
  - Double sheet detector

b. Register system

  - Sheet control wheels
  - Sheet hold down strips
  - Side register guides (including jogger)
  - Paper stops
  - Feed roller pressure
  - Feed roller timing

c. Cylinder system

  - Handwheel
  - Plate position
  - Plate to blanket pressure
  - Blanket to impression cylinder pressure
  - Vertical image position

d. Dampening system

  - Fountain solution (mixing)
  - Water feed control lever
  - Water form roller on/off control
  - Water ductor roller on/off control

Note: Some small presses feature a single lever control which allows the operator to contact water rollers to plate, contact ink rollers to plate, transfer image to the blanket cylinder and start feeder system with the movement of one lever.

e. Inking system

- Ink fountain adjusting screws
- Ink feed lever
- Ink form roller on/off control
- Ink ductor roller on/off control

f. Delivery system

- Ejector unit for tray and receding stacker
  - Rollers
  - Rings
- Paper turning wheels for chain delivery
- Stacker raise/lower crank
- Stacker lowering speed control
- Paper delivery guides (including jogger)

Objective 6

Sequence of paper movement through a typical offset press

Figure 1

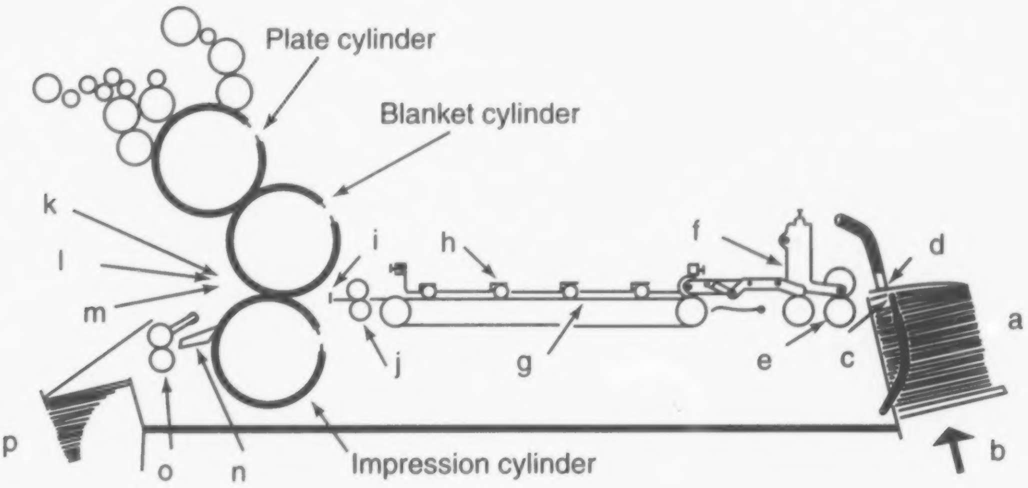


Plate cylinder
Blanket cylinder
k
l
m
i
h
f
d
a
j
g
e
c
p
o
n
Impression cylinder
b

a. Paper is placed on feed table.

b. Feed table raises automatically.

c. Sheet separators and air blowers separate sheets.

d. Sucker tube lifts paper, moving it to pullout rollers.

e. Pullout rollers move sheet to register board.

f. Double sheet detector prevents more than one sheet from going to register system at a time.

g. Several moving tapes carry paper along register board.

h. Balls and metal strips hold paper down on tapes.

i. Stop fingers move up and down to halt sheet for register to side position and for timing of feed into cylinder grippers.

j. Feed rollers move sheet into cylinder grippers.

k. Cylinder grippers grip sheet and guide it between impression and blanket cylinders.

l. Image transfers to paper from blanket by pressure from the impression cylinder.

m. After holding the sheet for less than one revolution, the cylinder grippers open.

n. Strippers separate the paper from the impression cylinder.

Note: On chain delivery systems the paper is transferred from cylinder grippers to chain grippers at this point.

o. Ejector wheels guide the paper into receiving tray or stacker.

p. Receiving tray or table (jogger) holds finished sheets.

Student Supplement 1—Automated Advancements

In today's printing industry new automated press equipment is widely used to save labor and time. These advancements have automated the areas of blanket washing, sheet size adjusting, plate hanging, plate registration, feeder/delivery adjusting, cleaning, and color matching.

These automated features have dramatically reduced makeready times and are incredibly accurate in plate mounting and registration. The automatic cleaning features consist of automatic ink roller cleaning, automatic blanket cleaning, and automatic impression cylinder cleaning.

One of the most important automated advancements to press operators is the density scanner. These scanners can fully control the ink density that is printed. Komori and X-Rite have introduced the PDC-S Print Density Control System. This scanner can read the density up to six colors on one set of color bars or up to eight colors on two different color bars. The Komori X-Rite scanner can also read color bars using a spectrophotometer. This scanner reads the light reflected from the color bars which interprets the data spectrally.

Student Supplement 2—Digital Impact on Press Activities

Electronic publishing is changing the printing industry with the availability and relative ease of use of page-layout and image editing programs, scanners, digital cameras, and photo CDs. Today, with a greater number of customers providing printers with digital files containing text, graphics, trim marks, and folding marks, direct and digital output of full-color documents is becoming the preferred method of printing for many jobs.

Through digital color printing, print shops can print directly from the customer's digital file, bypassing the multiple and time-consuming steps of film output, proofing, and imposition required by traditional methods. Digital presses, depending on the manufacturer, may create the page image using laser beams, powdered toner, or plates and ink. A common feature of all digital presses is the absence of the need for film.

Digital printing offers many advantages over conventional printing such as quick turnaround times, good color, and the ability to customize jobs. The capability of providing customers with personalized documents is, perhaps, digital printing's most unique feature. Customization of documents is accomplished through a technology called variable data printing that utilizes databases to easily update files. Variable data printing allows companies to provide their customers with personalized documents on demand.

It is important to note that digital printing isn't appropriate for all jobs. Digital presses are designed for short color press runs that are impractical on conventional printing presses. If a press run is too large the cost of printing on a digital press can exceed that of a conventional printing press. This is due to consumable expenses on a digital press.

Objective 7

Assignment Sheet 1—Compare Control Features of Offset and Digital Presses

Name ______________________ Overall Rating __________

Date ______________________

Evaluation Criteria	Rating
• Directions have been followed	______
• List properly matches presses examined	______

Basic Skills

Reading Writing Critical Thinking

Directions

Compare the control features of several presses. Go to school shop area, visit printing firms or departments, or use the pictures of the presses included with this assignment.

1. Make a list of similar control features found on all presses compared.

   Note: Manufacturers sometimes apply different names for similar features.

2. List control features that are unique to each press.

3. Turn your lists in to the instructor.

Objective 3

Areas of work in a preventive maintenance program

a. *Cleaning* equipment and work area

b. *Lubricating* equipment

c. *Adjusting* operator controllable settings on equipment

Objective 4

Preventive maintenance schedules

a. Daily—The regular cleaning that takes place after a day's run; the most important of the preventive maintenance schedules

b. Weekly—Usually takes place at the end of the work week; designed for blanket rotation or protection of other press elements while the press is not in use

Note: This also includes biweekly maintenance.

c. Monthly—Supplements daily and weekly cleaning and includes a complete cleaning of the total press from the top to the floor

Objective 5

Requirements for a preventive maintenance schedule in chart form

a. A preventive maintenance chart should include the three categories of work: cleaning, lubricating, and adjusting.

b. Each category should have columns for listing the time when work should be done: daily, weekly/biweekly, or monthly.

c. Each maintenance activity on the chart should have a block for marking the date when maintenance was performed.

d. The operator's manual and other manufacturer's guides should be referenced for lubrication and adjustments.

e. The back side of the PM chart should provide space to log the date problems occur, what the problems are, and how the problems are solved.

Objective 6

Preventive maintenance procedures for daily cleanup

> **Caution**: Always observe all safety precautions; when manual cleaning takes place, the power plug should be removed from its receptacle and only one operator should be at the press.

a. Ink system

- Use the blanket wash normally used for cleaning the blanket during the press run to clean ink rollers.
- Remove ink and follow cleanup procedure for all parts of the inking system.

b. Dampening system

Note: At best, molleton covers or sleeves will pick up some ink from the plate, but do not allow this ink to dry on roller surface.

- Wipe ink particles from roller cover using a cotton pad dampened with fountain solution, or
- Remove covered rollers from press and loosen ink with blanket wash, then flush blanket wash from cover with running water.
- Remove excess moisture from cover by rolling the roller with open palms on top of paper towels on a flat surface.
- Clean metal dampening rollers with plate cleaner or a water miscible cleaner or pumice powder and water to remove all ink, oil, or residue that repels water.
- A coating of gum arabic solution may be applied to metal rollers after cleaning.
- Change dampening roller cover if enough ink has been trapped on the surface to form an ink glaze that appears shiny.

  Note: On presses with integrated ink and water systems, there are no molleton covered rollers; if water fountain roller runs coated with ink, then dampening rollers will be cleaned by running in contact with ink rollers; if water fountain roller runs free of ink coating, then water fountain and ductor rollers must be cleaned separately from ink rollers.

c. Cylinders

- Use plate cleaner or nonabrasive water miscible cleaner on plate cylinder, then coat with plate etch.
- Thoroughly clean blanket with blanket wash and water, then clean blanket cylinder ends and dry blanket.
- Wipe ink from surface of impression cylinder with plate etch, or remove ink with blanket wash or deglazer, then clean with plate cleaner, degreaser, or water miscible cleaner, then coat with etch.

d. Press

- Use a shop towel dampened with blanket wash.
- Wipe ink, paper lint, dust, and oil from side covers, side frames, support bars, camshafts, and gear shafts.

e. Workstation

- Clean work table surface.
- Clean chemical shelf; wipe containers.
- Place dirty shop towels in safety can.
- Place all waste paper in trash cans.
- Arrange workstation in orderly manner.

Objective 7

Preventive maintenance procedures for weekly cleanup

a. Deglaze ink rollers and offset blanket.

b. Change blanket if rotation plan is followed.

c. Desensitize noncovered dampening rollers.

d. Degrease plate and impression cylinder surfaces.

Note: If blankets are not rotated, a good practice is to remove the blanket after cleaning, coat it with blanket powder, and leave it off the press over the weekend.

e. Clean ink ductor cam truck or follower.

f. Clean plate clamps.

g. Clean delivery stripping rollers and rings or chain delivery clamps and paper turning wheels.

h. Wipe oil and dirt off floor area under press.

i. Clean and/or wash vacuum pump filters according to operator's manual.

Note: Procedure may be necessary daily if fluffy or dusty paper is being run.

Objective 8

Preventive maintenance procedures for monthly cleanup

a. Unplug the power supply.

b. Remove all safety and dust covers.

c. Begin at the top of the press and work to the bottom of the press to remove all paper lint and dust from the total press.

Caution: Use an air compressor when one is available, but be sure to wear eye protection when compressed air is used in cleaning.

d. Clean oil, ink, paper particles, and dirt from vacuum and drive motors, side frames, cams, gears, levers, shafts, cylinder ends, and all hard-to-reach areas of the press.

e. Flush press vacuum pump with a mixture of solvent and oil.

> **Caution**: Most modern press designs use a carbon-vane vacuum pump which requires no backflushing. In fact, operator manuals for these presses strongly warn against using solvent and oil mixtures, which can severely damage such pumps. Carbon-vane pumps need only a periodic, usually weekly, cleaning of air filters. Always be certain to follow your press manufacturer's specifications for vacuum pump maintenance to avoid costly mistakes.

f. Clean vacuum and air blast filters, hoses, and air passages.

g. Clean upper and lower paper pull-out rollers or forwarding rollers.

h. Clean upper and lower paper feed rollers.

Objective 9

Procedures for daily, weekly, and monthly lubrication

Note: Parts should be lubricated **after** cleaning procedures are completed.

a. Unplug the power supply; never lubricate a press while it is running.

b. Use lubricants recommended by the manufacturer; do not use motor oil for machine lubrication.

Note: Filling a reservoir may require a quantity of lubricant, but in all other cases use lubricant sparingly because too much lubricant may cause more problems than too little lubricant.

c. Lubricate all friction points of exposed fast turning parts daily; the best time is just before beginning the day's run.

d. Lubricate all friction points of all exposed moving parts weekly.

e. Monthly lubrication should follow monthly cleanup before covers are replaced.

f. Lubricate all friction points monthly as designated by manufacturer's lubrication chart.

Note: The manufacturer may not list all of the areas needing lubrication, so the operator should observe and lubricate all points of friction.

g. Fill vacuum pump oil bottle to designated level each month.

Note: Be certain to check manufacturer's maintenance specifications for lubrication and lubricants. Some presses use a central, pressurized lubrication system which meets the needs of the vacuum pump. Severe damage can result if manufacturer's recommendations are not followed.

Objective 10

Daily and weekly adjustment procedures

> **Caution**: Do not make adjustments without specific permission from your instructor; then refer to operator's manual, maintenance manual, or your instructor for settings.

a. Student should not make adjustments until approved as an operator by the instructor.

b. Adjustments should be made as necessary to make-ready for each job order and should be made at will as needed.

Note: Routine operator adjustments may require the operator to square image on sheet, move image side to side, raise or lower image vertically, increase or decrease ink flow, increase or decrease water flow, feeder setup, delivery setup, register board setup, air blast, vacuum, set-off powder, and impression cylinder pressure.

c. Weekly adjustments should be those necessary to troubleshoot and solve problems.

Objective 11

Monthly adjustment requirements

a. Make an ink form roller check.

b. Adjust dampener rollers to plate cylinder.

Note: Procedures for adjustments on various presses are outlined in Job Sheet 1.

c. Adjust ink form rollers to plate.

Note: Procedures for adjustments on various presses are outlined in Job Sheet 2.

d. Adjust plate cylinder to blanket cylinder.

Note: Procedures for adjustments on various presses are outlined in Job Sheet 3.

e. Adjust blanket cylinder to impression cylinder.

Note: Procedures for adjustments on various presses are outlined in Job Sheet 4.

Information Sheet

Objective 12

Steps in making an ink form roller check

Note: To assure proper ink laydown and prevent plate wear, a check should be made of the ink form roller pressure on the plate cylinder; this procedure is applicable to most situations.

a. Ink up the press.

b. Gently drop the ink form rollers to the plate, then lift them.

c. Turn the handwheel to bring the plate around for inspection.

d. Uniform stripes of ink 1/8″ to 3/16″ wide indicate proper adjustment.

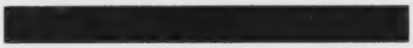
e. Irregular ink stripes indicate either uneven settings or worn rollers, and adjustments should be made to correct the problem.

Objective 13

Ink stripe configurations and their significance

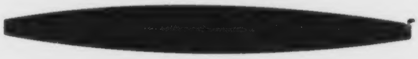
a. Ideal setting—Uniform ink stripe 1/8″ to 3/16″ wide indicates proper adjustment.

Figure 1



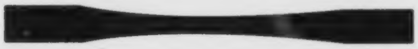
b. Roller worn at ends—Caused by form roller being set too tightly to oscillator roller; correct by resetting rollers or replacing them if desired setting cannot be obtained.

Figure 2



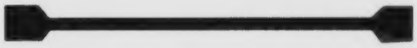
c. Low area in center—Indicates improper grinding or improper manufacture and should be replaced.

Figure 3



d. Roller swollen at ends—Results from continuously setting roller too tightly and should be replaced.

Figure 4



e. Setting uneven—Too heavy on one end and too light on the other end; adjust rollers.

Figure 5

Objective 14

Sequence of troubleshooting techniques

a. Make no assumptions.

b. Look for the simple cause and the simple solution.

Note: The solution may be as simple as plugging in the power cord.

c. Identify specific symptoms of the problem.

d. List the probable causes.

e. List possible solutions for each cause.

Note: Refer to operator's or maintenance manuals.

Caution: Adjustments should be made only with the power off and with the approval of your instructor.

Objective 15

Categories of press troubles

a. Operator

Note: The majority of problems are operator caused; they occur because of lack of knowledge, neglect, or carelessness.

b. Chemistry and ink

c. Paper stock

d. Image transfer process

e. Mechanical

Objective 16

Types of emulsification

a. Excess water in ink—Causes ink to pile on rollers, plate and/or blanket producing a grayed image on sheet

Note: Small amounts of water mixing into ink during the run normally cause little harm.

b. Excess ink in water—Produces overall tint in background area on the printed sheet

Objective 17

Technique for avoiding emulsification—Run the minimum amount of ink to give the job full color and the minimum amount of dampening solution to keep the plate clean.

Objective 18

Conditions that create ink drying problems

a. Relative humidity

b. Too much moisture run on the press

c. pH of fountain solution

Note: As pH value drops below 4.0, drying time increases significantly until a pH of 2.0 would take approximately 4 times the drying time on a typical offset paper.

d. Type of printing paper (absorbency)

e. pH of printing paper

Note: The pH of the paper stock becomes significant when the relative humidity is above 60%, especially on coated stock. Inks dry normally on uncoated papers having pH values above 4.5.

f. Lack of oxygen

Note: When running heavy solids, there may not be enough oxygen between sheets on the delivery pile to facilitate drying.

g. Temperature

Objective 19

Common ink problems on the press

a. Set-off—Ink is transferred from the front surface of one sheet to the back surface of the sheet above in the delivery pile.

b. Chalking—Ink on the paper turns dry and powdery.

c. Trapping—Ability of an ink to print over a previously applied ink is impaired.

d. Tinting—Emulsified ink suspended in the fountain solution on the plate surface appears as a uniform tint on the printed sheet.

e. Scumming—Plate picks up ink in the clear areas and transfers it to the clear areas of the sheet.

f. Piling—Ink builds up or piles on rollers, plate, and/or blanket.

g. Picking—Ink tears away parts of the paper coating as the sheet is printed; these appear as black spots in the blank areas of the printed sheet and white spots in the solid areas.

h. Misting—Ink flies into the atmosphere as fine mist, especially at high temperature and speed.

i. Toning—Ink adheres to nonimage area of plate because of lack of dampening and transfers to printed sheet.

Objective 20

Guidelines for evaluating good print quality

Note: The following is adapted from materials published by the 3M Company.

a. Crisp, dark lines and solids

b. A clean background

c. Clean halftones, screens, and reverses

d. Good registration

e. Each sheet dried completely

Objective 21

Print quality problems and their causes

Note: The following is adapted from materials published by the 3M Company.

a. Scumming—Background dirty because of too much ink, not enough moisture, dirty dampener roll covers, or dampener covers tied too tightly on ends

b. Gray, washed out—Not enough ink, too much moisture, wrong color of ink, incorrect dampener form roller pressure, incorrect plate-to-blanket pressure, or incorrect impression-to-blanket pressure

c. Gray, washed out dirty background—Glazed ink rollers, glazed blanket, too much ink form roller pressure, or too much dampener form roller pressure

d. Copy too dark—Too much ink, too much impression-to-blanket pressure, not enough plate-to-blanket pressure, or too many revolutions on blanket without paper going through causing buildup on blanket

e. Uneven printing—Incorrect ink distribution, glazed rollers, incorrect dampener form roller parallel pressure, poor paper surface, incorrect ink form roller parallel pressure, incorrect plate-to-blanket parallel pressure, incorrect impression-to-blanket parallel pressure, or dirty impression cylinder

f. Double image (blurred copy)—Loose blanket, too much ink and fountain solution, not enough plate-to-blanket pressure, loose plate, or incorrect impression-to-blanket pressure

g. Weak spots (spotty copy)—Incorrect plate-to-blanket pressure, incorrect impression-to-blanket pressure, low spots in blanket, tacky ink, tacky blanket, dirty impression cylinder, or blind image on plate caused by dried gum or too strong fountain solution

h. Image breakdown during run—Too much dampening form roller pressure, too much ink form roller pressure, too much plate-to-blanket pressure, fountain solution too strong, or end play in form rollers

i. Streaking—Incorrect ink form roller pressure, incorrect dampener form roller pressure, incorrect plate-to-blanket pressure, incorrect impression-to-blanket pressure, improper ink, or loose blanket

j. Improper register—Loose blanket, side guides not set properly, paper not cut straight, or cam band not set

k. No image at all—Not enough ink roller form pressure, not enough plate-to-blanket pressure, not enough impression-to-blanket pressure, too much moisture, glazed blanket, or glazed ink rollers

l. Paper curling in receiver—Too much moisture or a curl in the paper

m. Paper nicking on edge—Paper stop fingers too high, feed rollers not set properly, or paper hitting back stop in receiver too hard

n. Paper missing grippers—Stop fingers incorrectly set or feed rollers out of adjustment

o. Paper wrinkling—Too much moisture, paper damp, too much pressure between blanket and impression cylinder, or register board not set properly

Student Supplement 1—Troubleshooting Guide for Ink and Dampening Problems

Note: The following is adapted from material published by the 3M Company.

PROBLEM	CAUSE	SOLUTION
Ink Set-Off in Delivery Pile	Too much ink on paper	Readjust ink settings.
	Too much acid in fountain solution	A low pH retards drying. Test pH of solution. If not between 3.8 and 5.5, adjust accordingly.
	Wrong ink for stock	Contact ink supplier.
	Not enough drier in ink	Increase drier content. Contact ink supplier for correct drier.
	Paper coating or poor quality	Use paper of better quality.
	Ink too stiff, causing absorption problems	Add light varnish to ink.
	Delivery pile too high	Reduce lift height.
	Press operator bends paper pile when removing from press	Use skid under pile and lift paper by skid load only.
	Pressroom humidity high	Close windows, increase room temperature.
	Running with too much water	Run with minimum ink and water.
	Static in the delivery pile attracting sheets to each other	Increase pressroom humidity. Precondition paper to pressroom conditions. Use a tinsel static eliminator across delivery areas so paper contacts it. Use commercial static eliminators.
	Not enough or improper spray powder	Increase amount of spray powder or increase the particle size of spray powder.
Ink Chalking	Ink vehicle absorbed by paper before ink has time to set properly on paper surface	Add a binding base to control absorption by paper.
	Not enough drier in ink	Add drier to ink. Check with ink supplier for correct drier.
	Job printed with wrong ink for stock used	Over-print with varnish.

PROBLEM	CAUSE	SOLUTION
Ink Trapping (ink does not adhere to previously printed color)	Ink dries hard before next color	Run all colors as quickly as possible without risking ink set-off.
	Ink tack incorrect	Consult ink supplier.
	Wrong drier used on first color down	Use different drier on first color. Consult ink supplier.
Tinting/Catch Up (ink can be wiped from plate)	Emulsified ink suspended in the fountain solution appears as a uniform tint on the printed sheet	Smear small amount of ink on glass. Place several drops of fountain concentrate on ink. Rub together with finger. If two mix readily, the ink is faulty. Wash-up and replace ink.
	Alkaline or proteinous paper, causing ink emulsification	Adjust fountain pH to needs of paper. Check paper; change if necessary.
	Fountain solution	If pH is above 6.0, tinting can result. Readjust pH of fountain. Allow dampeners to become completely wet before printing.
	Lack of water	Set top dampener lighter than lower. Ductor not contacting pan roller firmly. Reset. Ductor roller covering compressed and dirty. Clean or replace. Adjust ductor-to-vibrator roller to a firm pressure. Clean and etch pan roller and recover if slimy and dirty. Increase dwell time of ductor roller on pan roller. Check for low spots in dampening rollers–correct. Dirty dampeners–clean.
	Excessive ink	Reduce ink level and allow adequate time for adjustment to take full effect.
	Poor (weak) varnish ink	Replace with better ink.
	Breakdown of pigment particles in the ink	Ink may be at fault. Notify the ink manufacturer. May need reformulated ink.
	Acid getting into ink from an improperly washed-out plate	Wash up press. Replace ink. Reprocess the plate.
Scumming or Tinting	Plate or press condition	"Wet hone" plate in problem area. If honed area continues to take ink, the problem is tinting caused by an inking problem on the press. If area stays clean it is scumming caused by plate sensitivity.

PROBLEM	CAUSE	SOLUTION
Scumming	Sensitive plate	Desensitize.
	Highly bichromated fountain solution	Check solution and remix if necessary.
	Plate exposed to light after fountain solution allowed to dry on it	Desensitize or remake plate.
	Excessive printing pressure could indirectly cause scum	Check cylinder pressures, adjust as needed.
	Paper or ink causing plate sensitivity	Check out paper and ink.
	Negative plate improperly desensitized or lightstruck	Desensitize or re-make plate.
	Positive plate underexposed; water on plate during developing/fixing; improperly desensitized	Remake plate.
	Ink form roller setting	Check ink form roller setting to the vibrator roller and to the plate. The vibrator roller should drive the ink form roller and not the plate.
	Fountain solution too weak or improperly mixed	Increase strength or remix.
	Ink sensitizing plate background beyond image area	Desensitize with plate cleaner-conditioner.
	Glazed offset blanket	Clean all gum, spray, paper sizing, etc. from blanket with deglazer and pumice.
	Low alcohol content	Bring to correct concentration.
Ink Piling on Rollers	Too much water	Check to adjust all dampener settings.
	Ink too short	Add longer varnish.
	Coating from paper	Use another stock.
Toning	Out of fountain solution	Add fountain solution.
	Dampening form roller pressure too light	Increase pressure.
	Too little fountain solution being run	Increase quantity.
	Dampening form roller cover dirty	Clean cover. Change cover.

Student Supplement 1

PROBLEM	CAUSE	SOLUTION
Picking and Hickies (defects in printed image caused by dried ink, dirt or paper fibers on plate and blanket)	Worn or cracked rollers deposit tiny particles of dry ink onto plate	Remove from press and clean thoroughly. Regrind or replace if necessary.
	Lint, gum, dried ink skin, etc. in ink fountain	Use lintless dampeners. Clean inking system; use fresh ink.
	Dirt or dust on paper	Fan sheets thoroughly. Wipe edges of paper load with glycerin. Vacuum load edges. Be sure slitter knife in paper cutter is sharp. Be sure stock was back-trimmed (cut with correct edge of knife). Inspect sheet cleaning equipment.
	Weak paper surface	Use ink and paper suited to each other.
	Dirty plate	Wash plate before resuming the run. Visually check to be sure no specks or particles are still clinging to its surface.
	Tacky blanket	Wash blanket. Apply sulfur powder.
	High ink tack	Reduce tack slightly. Do not use more than 1/2 oz. reducer per lb. of ink. Do not allow press to stand idle too long allowing tack of ink to increase. Add varnish or lubricant to nonprinting areas of rollers.
	Excessive blanket to impression pressure	Decrease pressure between the blanket and impression cylinders.
	High press speed	Reduce press speed.
	Excess water reaching stock	Run with minimum water.
	Heavy form	Run light forms first.
Ink Misting (flies into atmosphere as fine mist)	Ink too soft	Add heavier varnish to ink.
	Ink rollers are nicked or out-of-round	Inspect all rollers and replace defective ones.
	Too much ink	Reduce ink fountain settings.
	If dots appear on press parts, ink is too thin	Add mixing white and heavy varnish. Use a heavier ink.

PROBLEM	CAUSE	SOLUTION
Ink Misting (continued)	If little ink lines appear on press parts, ink is too thick	Add thin varnish.
	Ink rollers set too tightly	Reset ink rollers.
	Ink rollers too hard	Replace rollers.
	Ink rollers swollen	Use a more volatile press wash. Reset the rollers.
	Ink rollers too soft	Replace the rollers.
Ink Roller Stripping (rollers do not accept ink)	Fountain solution too acid	Test pH of solution. If it is not between 3.8 and 5.5, adjust accordingly.
	Glazed form roller	Remove from press and deglaze and pumice. Rinse thoroughly.
	Too much water being run	Cut back water at fountain.
	Desensitized metal vibrator rollers	Clean rollers, copperize, wash thoroughly. Then reink rollers and wash again before using.

Student Supplement 2—Troubleshooting Guide for Paper Stock Problems

Note: The following is adapted from material published by the 3M Company.

PROBLEM	CAUSE	SOLUTION
Paper Curling	Too much water	Run with minimum water.
	Paper not properly conditioned	Condition paper to pressroom conditions.
	Room humidity not constant	Install proper controls.
	Heavy copy at end of form	Reverse plate if possible.
	High ink tack	Reduce tack of ink with reducing varnish.
	Excess blanket to impression cylinder pressure	Reduce impression setting.
Paper Rolls into Delivery Tray	Short grain stock	Set ejector rollers and rings. Slow press. Change to long grain.
	Ejector rollers and rings not set properly	Set ejector rollers near edges of sheet with rings just outside rollers.
Sheet Wrinkle (gripper edge to trailing edge)	Excess blanket to impression cylinder pressure	Reduce pressure.
	Excess or uneven feed roll pressure	Reduce pressure.
	Excess sheet edge moisture; unwrapped stock left in high humidity area	Allow paper stock to adjust to room humidity. Open packages of stock and use immediately.
	Sheet not fed correctly	Check stack height, sheet guides, air blast and vacuum.
Sheet Lead Edge Corner Folded	Stack height on feeder not correct (usually too low)	Set stack height to sucker feet for weight of stock being fed.
	Sheets not square on feed table	Adjust paper guides to hold sheet square to front plate.
	Pullout rollers set too close to sheet edge	Move pullout rollers toward center of sheet.
	Paper not square in register position	Set side register guides to hold sheet square.
	Uneven feed roll pressure	Check pressure, adjust for equal pressure end to end.

Student Supplement 2

PROBLEM	CAUSE	SOLUTION
Paper Nicking on Lead Edge	Paper stop fingers too high	Adjust fingers to clear as feed roller touches paper.
	Feed roller not timed correctly (contacting paper before stop fingers move)	Adjust cam to retard feed roller.
	Too much feed roller pressure	Reduce feed roller pressure.
	Paper hitting back stop in receiver too hard	Set paper bail to slow sheet travel. Make sure paper strikes back stop squarely.
	Chain delivery grippers not timed correctly with impression cylinder	Set gripper opening on each chain bar, then set chain timing with cylinder.

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Student Supplement 3—Troubleshooting Guide for Registration Problems

PROBLEM	CAUSE	SOLUTION
Image Moving on Sheet; "jumping" and/or "bouncing"	Front paper guide too tight	Adjust paper guide to fit snug against the front edge of the sheet.
	Control wheel too loose	Adjust control roller. The paper should remain flat without buckling.
	Brush wheels too loose	Tighten wheels.
Paper Moving Sideways	Front paper guides set too loose	Adjust paper guides to fit snug against the front edge of the sheet.
	Jogger side guide set too loose	Adjust the guide so that sheet will not buckle when the guide is all the way in.
Sheets Feeding Crooked	Vacuum tubes out of adjustment	Check all tubes making sure that all tubes are set equally.
	Conveyor tapes out of adjustment	Adjust the tapes according to the press manual.

Student Supplement 4—Troubleshooting Guide for Process (Image Transfer) Problems

Note: The following is adapted from material published by the 3M Company.

PROBLEM	CAUSE	SOLUTION
Plate Inks up Solid	No fountain solution	Add fountain solution.
	Dampening form roller not on	Turn roller on.
	Dampening form roller not adjusted properly (too little pressure)	Adjust dampening form roller.
	Obstruction holding dampening form roller off plate	Remove or correct obstruction.
Plate Will Not Take Ink in Image Area (blind plate)	Gum not removed from plate surface	Remove gum.
	Ink form rollers not on	Turn rollers on.
	Incorrect ink form roller pressure	Set rollers to correct pressure.
	Too much acid in fountain solution	Keep pH factor between 3.8 and 5.5 (prevents gum from desensitizing plate image).
	Emulsified ink (ink loses its ability to protect image from gum arabic; often accompanied by roller stripping and/or washed out copy)	Change to better ink, clean rubber rollers, raise pH of fountain, clean metal rollers if stripping.
	Too much gum arabic in fountain solution	Gum content should be kept at one ounce or less per gallon of fountain solution.
	Detergent in water, sponge, dampeners or ductor reaching plate image	Thoroughly rinse ductor and dampener roller with one ounce fountain concentrate to a gallon of water before installing on press.
	Plate cleaners or scratch removers dried on plate image	Always rinse plate thoroughly immediately after application.
	Ink lacking tack will not adhere to image	Consult ink supplier.
Plate Will Not Run Clean	Plate surface oxidized	Clean with scratch remover. Make new plate.
	Too much ink	Reduce amount of ink on rollers.

Student Supplement 4

PROBLEM	CAUSE	SOLUTION
Plate Will Not Run Clean (continued)	Contaminated fountain solution	Make fresh fountain solution.
	Incorrect dampening form roller pressure	Adjust roller pressure.
	Out-of-date plate or contaminated plate	Make new plate. Open new box of plates.
	Bad negative causing background area exposure on plate	Opaque negative. Remake negative. Make new plate.
	Emulsified ink on form rollers	Wash press and reink.
Printed Image Has Overall Faded Appearance	Plate image blinding (too much acid in fountain solution)	Mix fresh fountain solution.
	Too much fountain solution being run	Reduce quantity.
	Too little ink being run	Increase ink feed.
	Emulsified ink on form rollers	Wash ink system, reink.
	Glazed ink rollers	Deglaze; reink.
	Glazed blanket	Deglaze blanket.
	Ink form roller pressure incorrect (too light)	Set correct pressure–increase.
	Dampening form roller pressure incorrect (too heavy)	Set correct pressure–decrease.
	Plate to blanket cylinder pressure too light	Increase pressure.
	Blanket to impression cylinder pressure too light	Increase pressure.
Weak or Open Areas in Printed Image	Plate worn	Redevelop plate. Make new plate.
	Plate to blanket cylinder pressure too light	Increase pressure.
	Blanket to impression cylinder pressure too light	Increase pressure.
	Damaged blanket	Apply blanket fix to swell area. Remove blanket and roll out damaged area. Change blanket.
	Paper particle buildup on blanket	Clean blanket with blanket wash and water miscible cleaner.
	Irregular stock surface	Increase blanket to impression cylinder pressure. Change stock.

PROBLEM	CAUSE	SOLUTION
Double Image (Ghost Image) on Printed Sheet	Loose plate	Tighten plate tail clamp.
	Loose blanket	Tighten blanket (be careful to tighten evenly).
	Too much plate to blanket cylinder pressure	Decrease pressure.
	Too much blanket to impression cylinder pressure	Decrease pressure.

Student Supplement 5—Troubleshooting Guide for Mechanical Problems

Note: The following is adapted from material published by the 3M Company.

PROBLEM	CAUSE	SOLUTION
Press Will Not Turn On	Disconnected from power source	Plug in cord. Replace fuse. Repair connection.
	Power switch not operative	Reattach loose wires. Repair or replace switch.
Paper Will Not Feed	Vacuum pump not on	Turn switch on. Repair loose or broken wires. Replace switch.
	No vacuum or air blast (pump drive motor on)	Check pump drive belt (replace if broken).
	No vacuum or air blast at feeder (pump is on)	Repair or replace broken or leaking hose. Loosen sticking pump vanes (flush with mixture of oil and solvent).
	Feeder level not operative	Replace loose or broken spring. Tighten loose screws.
	Paper stack too high or too low	Check feed table release. Set stack height for stock being fed. Correct stack height feelers.
	Paper guides too tight	Set guides to touch sheet edges but not bind.
	Sucker feet worn	Replace rubber feet.
	Sucker tubes open	Close off tubes not in use.
Paper Skip-Feeds	Stack height not correct	Set stack height for stock being fed.
	Paper guides too tight	Set guides to touch edges of sheet but not bind.
	Paper weight too far forward for stock being fed	Move weight back.
	Air blast setting not correct	Increase air blast.
	Vacuum setting not correct	Increase vacuum.

PROBLEM	CAUSE	SOLUTION
Paper Skip-Feeds (continued)	Sucker tubes not in use are open	Cover tubes not in use.
	Heavy paper stock	Increase vacuum. Increase air blast. Loosen trailing edge paper guide.
	Paper edges sticking together (dull cutter blade)	Remove stock, fan on all four sides. Restack on feeder.
Feeding Two or More Sheets	Stack height not correct	Set stack height for stock being fed.
	Too much air blast	Decrease air blast.
	Too much vacuum	Decrease vacuum.
	Paper weight too far back	Move weight forward.
	Paper guides loose (especially trailing edge guide)	Set guides to touch sheet edges but not bind.
	Sheet separators bent out of shape	Reshape separators.
Feed Table Will Not Lift	Lowering release latch not reset	Reset latch.
	Stack height control setting incorrect	Set for stock being fed.
	Lift adjustment incorrect	Set lift mechanism to engage lift gear.
	Obstruction blocking lift mechanism	Locate and remove obstruction.

Objective 22

Assignment Sheet 1—Use a Troubleshooting Guide to Find the Best Solution to an Ink and Dampening Problem

Name ______________________ Overall Rating __________

Date ______________________

Evaluation Criteria	Rating
• Directions were followed	______
• Printing conditions correctly identified	______
• Causes and solutions correctly listed	______

Basic Skills

Reading Writing Critical Thinking

Directions

Identify the ink and dampening problem illustrated in the photograph below. Use Student Supplement 1, "Troubleshooting Guide for Ink and Dampening Problems" to complete the information on the next page.

Assignment Sheet 1

1. Identify the printing condition of the example by name.

   ____

2. List at least six possible problems in the ink and dampening system which would cause the results seen in the example, and give possible solutions to these problems. Record your answers in the following chart.

Possible Problems	Possible Solutions

Objective 23

Assignment Sheet 2—Use a Troubleshooting Guide to Find the Best Solution to a Paper Stock Problem

Name ______________________ Overall Rating __________

Date ______________________

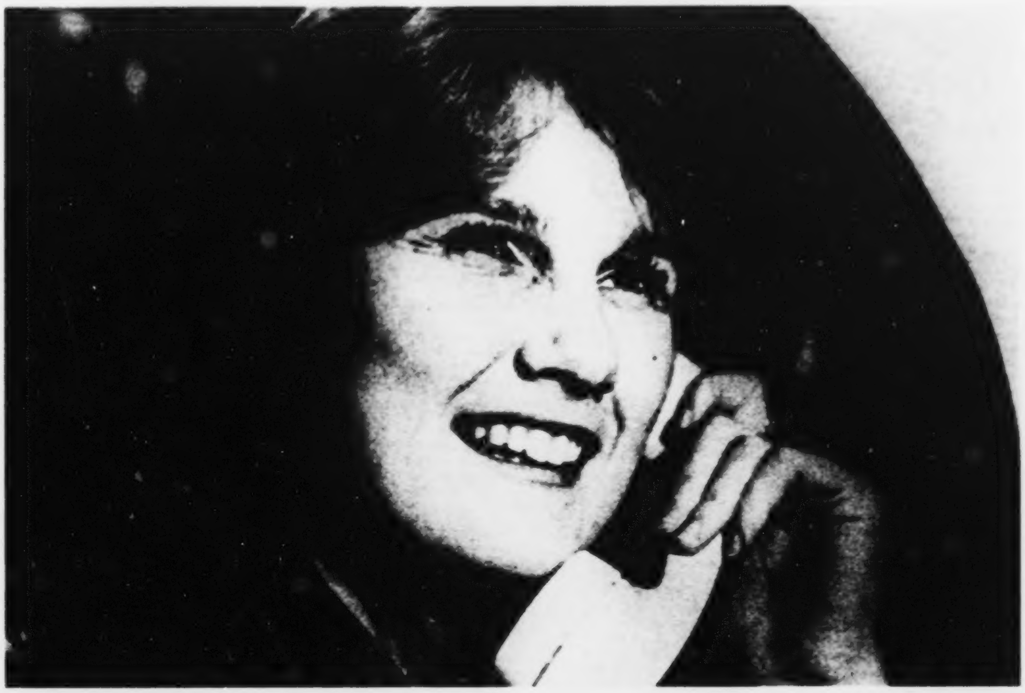
Evaluation Criteria	Rating
• Directions were followed	______
• Printing conditions correctly identified	______
• Problems and solutions correctly listed	______

Basic Skills

Reading Writing Critical Thinking

Directions

Identify the paper stock problem illustrated in the photograph below. Use Student Supplement 2, "Troubleshooting Guide for Paper Stock Problems" to complete the information on the next page.



Assignment Sheet 2

1. Identify the printing condition of the example by name.

   ____

2. List at least six possible problems with paper stock which would cause the results seen in the example, and give possible solutions to these problems. Record your answers in the following chart.

Possible Problems	Possible Solutions

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Objective 24

Assignment Sheet 3—Use a Troubleshooting Guide to Find the Best Solution to a Registration Problem

Name ______________________ Overall Rating __________

Date ______________________

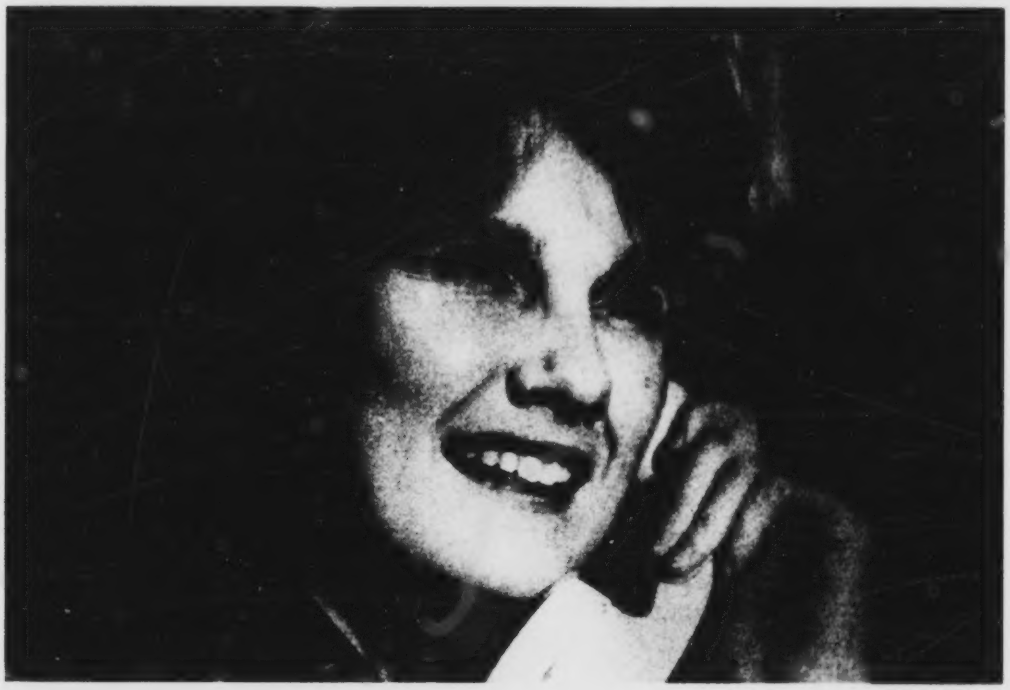
Evaluation Criteria	Rating
• Directions were followed	______
• Printing conditions correctly identified	______
• Problems and solutions correctly listed	______

Basic Skills

Reading Writing Critical Thinking

Directions

Identify the registration problem illustrated in the photograph below. Use Student Supplement 3, "Troubleshooting Guide for Registration Problems" to complete the information on the next page.



Assignment Sheet 3

1. Identify the printing condition of the example by name.

____

2. List at least three possible causes for the registration problem illustrated in the photo on the previous page, and give possible solutions. Record your answers in the following chart.

Possible Causes	**Possible Solutions**

Objective 25

Assignment Sheet 4—Use a Troubleshooting Guide to Find the Best Solution to a Process Problem

Name ______________________ Overall Rating __________

Date ______________________

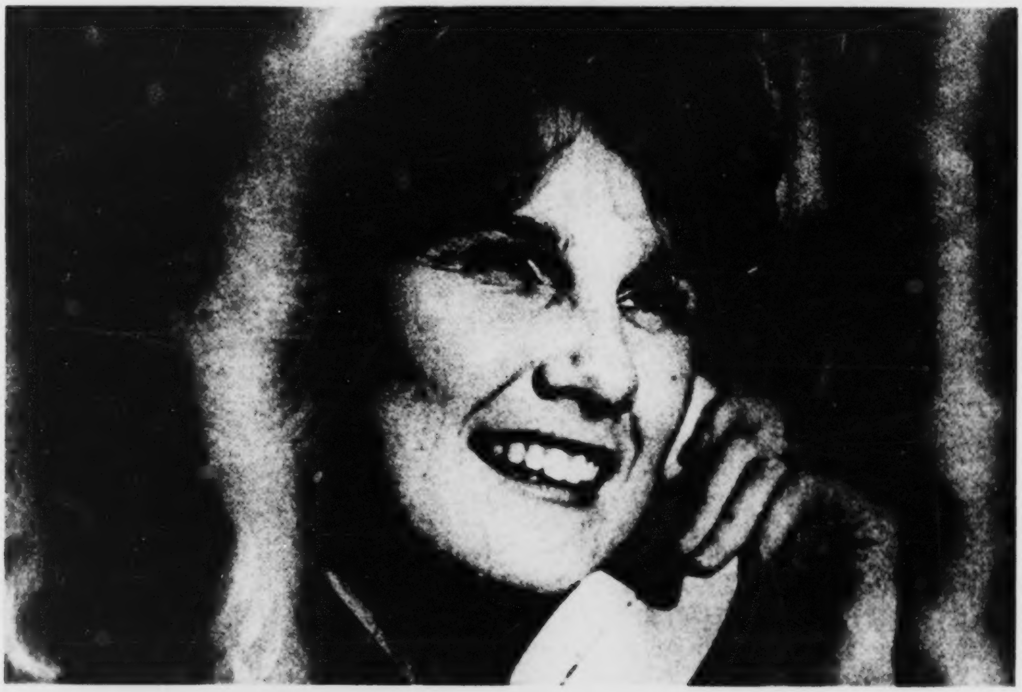
Evaluation Criteria	Rating
• Directions were followed	______
• Printing conditions correctly identified	______
• Problems and solutions correctly listed	______

Basic Skills

Reading Writing Critical Thinking

Directions

Identify the process problem illustrated in the photograph below. Use Student Supplement 4, "Troubleshooting Guide for Process (Image Transfer) Problems" to complete the information on the next page.



Assignment Sheet 4

1. Identify the printing condition of the example by name.

   ____

2. List at least six possible problems with process (image transfer) which would cause the results seen in the example, and give possible solutions to these problems. Record your answers in the following chart.

Possible Problems	Possible Solutions

Objective 26

Assignment Sheet 5—Use a Troubleshooting Guide to Find the Best Solution to a Mechanical Problem

Name ______________________________ Overall Rating __________

Date ______________________________

Evaluation Criteria	Rating
• Directions were followed	______
• Problem cited and possible solution outlined	______

Basic Skills

Reading Writing Critical Thinking

Directions

Your instructor will provide you with a press adjusted so as not to allow paper to feed. Use Student Supplement 5, "Troubleshooting Guide for Mechanical Problems" to complete the following steps.

1. Locate and identify the problem—do not correct it.
2. Write down the problem and possible solution and turn in your answer to your instructor.

Objective 27

Assignment Sheet 6—Determine Lubrication Requirements for a Specific Press

Name ______________________ Overall Rating __________

Date ______________________

Evaluation Criteria	Rating
• Directions were followed	______
• Lubrication points correctly listed and labeled	______

Basic Skills

Reading

Writing

Directions

Your instructor will provide you with a manufacturer's manual and a lubrication chart for a specific press; from this information, and with your instructor's guidance, complete the following information.

a. List daily lubrication points.

b. List weekly/biweekly lubrication points.

c. List monthly lubrication points.

Note: Retain your list for use in completing Assignment Sheet 7.

Objective 28

Assignment Sheet 7—Set Up a Preventive Maintenance Schedule in Chart Form

Name ______________________________ Overall Rating __________

Date ______________________________

Evaluation Criteria	Rating
• Directions were followed	______
• Preventive maintenance schedule correctly listed	______

Basic Skills

Reading Writing Critical Thinking

Directions

Use the example on the next page as a guide and set up a preventive maintenance schedule in chart form for a specific piece of equipment as selected by your instructor and a specific list of items to be checked as assigned by your instructor. Information obtained for Assignment Sheet 6 may be used if your instructor so directs.

Assignment Sheet 7

Figure 1

Preventive Maintenance Schedule

Equipment

Activity	Daily	Weekly/Biweekly	Monthly
CLEAN Date Performed M T W T F	Clean ink, oil, lint, and dust from all exposed surfaces of press and work area.	Clean total press including side frame surfaces, work area, and floor under press. Date	Remove press side covers, clean oil, grease, lint, and dust from all surfaces; deglaze rollers and blanket. Date
LUBRICATE Date Performed M T W T F	Oil friction points of fast moving parts. (List points.)	Oil friction points of all exposed moving parts. (List points.) Date	Remove side covers; oil and/or grease all friction points. (List points.) Date
ADJUST Date Performed M T W T F	Make adjustments as required for jobs being printed.	Make adjustments as required to solve problems. Date	Check and adjust as required all operator controllable settings; form roller parallel, form roller pressure, all cylinders parallel, all cylinders pressure. Date

Operator's guide or manufacturer's guide(s) to use for determining proper lubrication and adjustments ______________________________

Back Side of Chart

Date	Problem	Solution

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Objective 29

Assignment Sheet 8—Take an Inventory of Spare Parts

Name ____________________ Overall Rating __________

Date ____________________

Evaluation Criteria	Rating
• Directions were followed	______
• List accurately prepared	______

Basic Skills

Reading Writing Mathematics

Directions

Your instructor will assign you a press and a collection of spare parts. Identify the parts, count them, and make a list of what and how many items you have. Turn in your list to the instructor.

Press: ____

Name of Part	How Many

Objective 30

Job Sheet 1—Adjust Dampener Rollers to Plate Cylinder

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Instructions were followed	______
• Dampener rollers to plate cylinder adjusted properly according to operator's manual	______

Basic Skills

Reading Critical Thinking Employability Technology

Introduction

This exercise is aimed at familiarizing the student with press adjustments to provide proper roller pressures.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

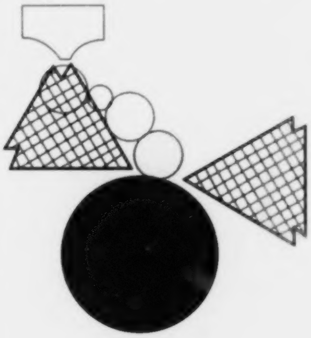
Tools, equipment, and materials

- 1-inch wide strips of 20-lb bond paper or two .005 Imation dampening gauges
- Screwdriver
- Allen wrench, if required
- Box end wrench or adjustable wrench
- Adjustment wrench, if required
- Operator and/or maintenance manual for selected duplicator

Caution: The improper use of tools may result in severe bodily injury or damage the equipment.

Procedure

Figure 1

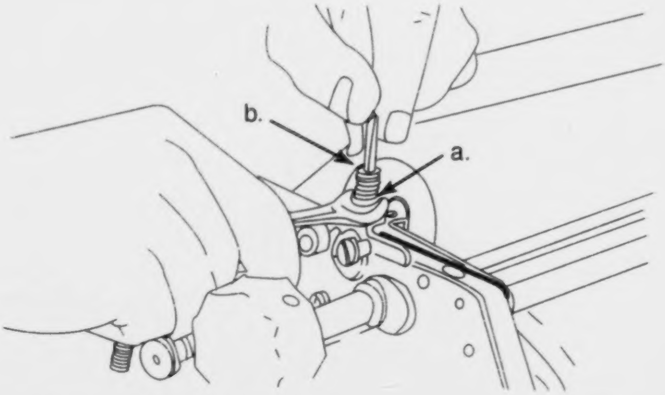


Note: It is important to have equal pressure at all points between the dampening roller and the plate cylinder; depending on the duplicator or duplicators available, your instructor may direct you to complete all or some of the procedures outlined or use the procedures as guidelines for a selected duplicator; these procedures are adapted from materials published by the 3M Company.

- ☐ 1. Mount a plate on the plate cylinder.
- ☐ 2. Place two 1-inch-wide strips of 20-lb bond paper or two .005 Imation dampening gauges between the roller and the plate.
- ☐ 3. Put the roller in the **ON** position and slowly pull on the strips.
- ☐ 4. Determine if the pull on the strips is uneven; this means the roller is not parallel with the plate cylinder.
- ☐ 5. Determine if the pull on the strips is too heavy or too easy; this means the overall pressure between the roller and plate cylinder must be adjusted.
- ☐ 6. Adjust the dampener rollers on an ATF Chief 15 or Chief 17 with the following procedure (Figure 2):
    - ☐ a. Loosen locking nut (a).
    - ☐ b. Turn the dampener form roller adjusting screw (b) clockwise if the test strip is too tight or counterclockwise if too loose.
    - ☐ c. Tighten locking nut (a).

☐ d. Repeat the paper test to make sure that the proper amount of adjustment has been made.

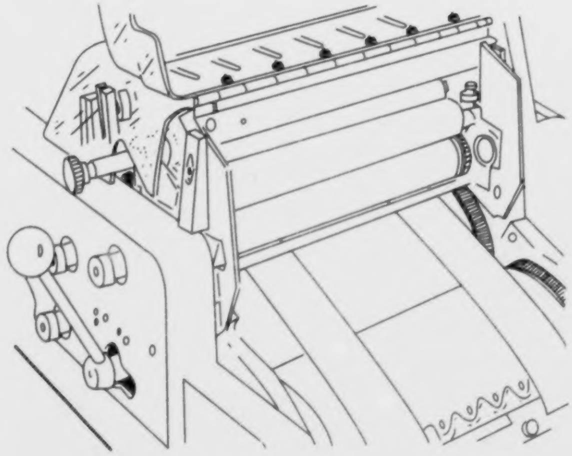
Figure 2



Courtesy of American Type Founders, Inc.

☐ 7. Adjust the dampener rollers on a Multilith 1250 Offset only with the guidance of your instructor or Multigraphics service representative (Figure 3).

Figure 3



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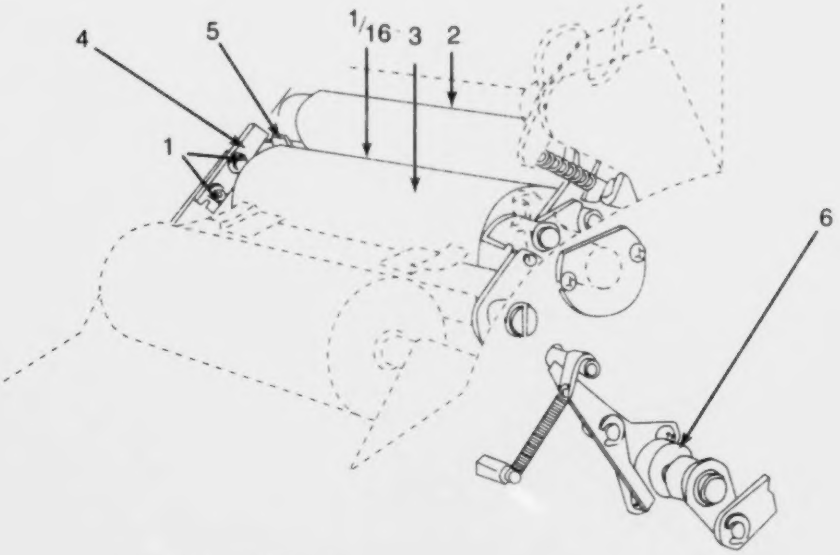
☐ 8. Adjust the gap between the aquamatic oscillator and the aquamatic ductor roller on an A.B. Dick 360 only under the careful guidance of your instructor or watch the procedure as it is performed by an A.B. Dick service representative (Figure 4).

Figure 4



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☐ a. Position the following:

- Operation control lever in "Neutral."
- Form roller levers in "On."
- Aquamatic night latch lever in "Operate."
- Aquamatic control lever at "45."
- Aquamatic lockout lever in "Automatic" (down).

☐ b. Loosen two locking screws (1) both sides of machine.

☐ c. Move aquamatic control to obtain a gap of $^1/_{16}$" between the aquamatic ductor roller (2) and oscillator (3). Handwheel may also have to be turned to obtain $^1/_{16}$" gap.

☐ d. Adjust arms (4) to butt against ears (5) of ductor roller levers.

☐ e. Tighten screws (1) on both sides.

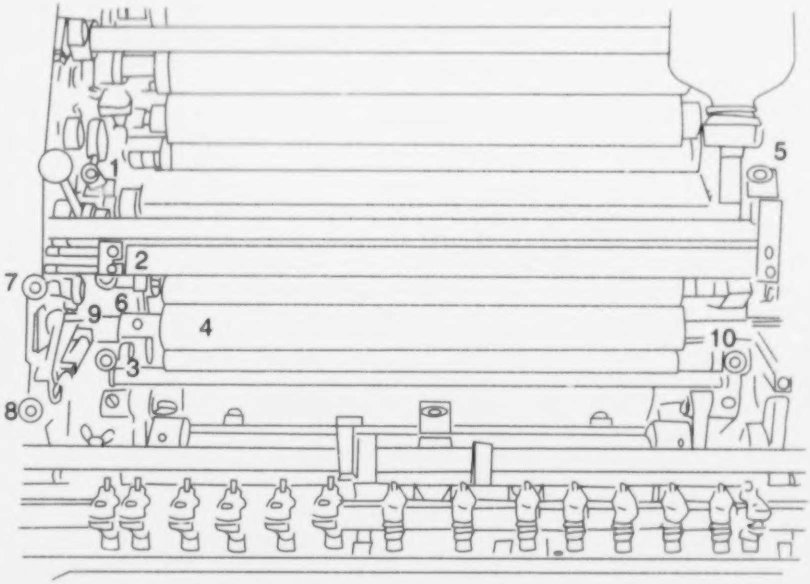
☐ f. Loosen set screw in eccentric collar (6). Set high of eccentric in the upper range. Tighten the set screw (6).

☐ g. Move operation control lever from "Neutral" to "Ink" and back several times while turning handwheel. Observe the release and lockout action of arms (4). Test machine under power also.

☐ h. Rotate collar (6) as necessary for proper lockout and release, and/or refine arm (4) adjustment.

☐ 9. Adjust the upper and lower form dampening rollers on the Heidelberg GTO with the following procedure (Figure 5).

Figure 5



Courtesy of Heidelberg USA, Inc.

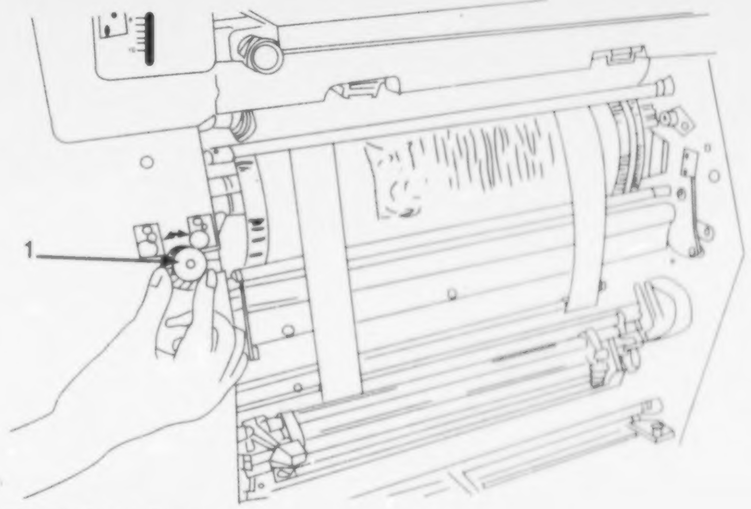
☐ a. Adjust the upper form dampening roller to the plate by the adjusting screw (No. 7) only while the press is running. The setting is correct when only a slight "roller bounce" is felt through the screwdriver when the roller passes over the plate cylinder gap.

Note: Heidelberg recommends using the long screwdriver delivered with the press as the proper tool for this procedure.

☐ b. Adjust the lower form dampening roller to the plate by the adjusting screw (No. 8), using the same procedure as with the upper form dampening roller.

☐ 10. Adjust the pressure between the dampening form roller and the plate cylinder on the Itek 3985 with the following procedure (Figure 6).

Figure 6



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- ☐ a. Set operating lever to bring dampening form roller into contact with the plate.
- ☐ b. Check pressure with paper strips.
- ☐ c. Adjust accordingly with adjustment knobs (1) on both operator and nonoperator sides of press. Turning knobs in counterclockwise direction will increase pressure.

☐ 11. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ____________________

____

____

Objective 31

Job Sheet 2—Adjust Ink Form Rollers to Plate

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	**Rating**
• Instructions were followed	______
• Ink form rollers to plate adjusted properly according to operator's manual	______

Basic Skills

Reading Critical Thinking Employability Technology

Instructions

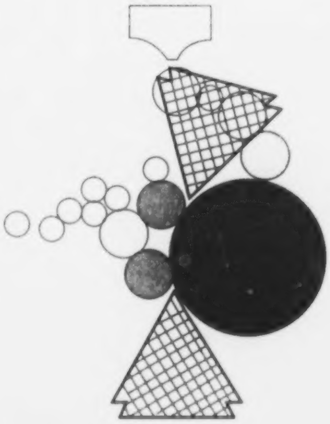
When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Screwdriver
- Allen wrench, if required
- Box end wrench or adjustable wrench
- Adjustment wrench, if required
- Operator and/or maintenance manual for selected duplicator

Procedure

Figure 1



Note: A properly adjusted machine is indicated when an ink roller check gives uniform parallel stripes of ink; irregular stripes indicate either uneven settings or worn rollers; depending on the duplicator or duplicators available, your instructor may direct you to complete all or some of the following procedures or use the procedures as guidelines for a selected duplicator; these procedures are adapted from materials published by the 3M Company.

☐ 1. Adjust the ink form rollers on an ATF Chief 15 or Chief 17 with the following procedures (Figure 2).

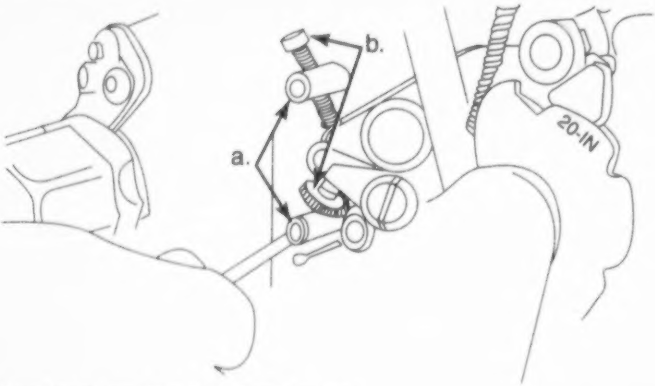
  ☐ a. Loosen ink form roller lock screw (a) on the side requiring adjustment.

  ☐ b. Turn the ink form roller adjusting screw (b) clockwise to decrease the width of the stripe or counterclockwise to increase the width of the stripe.

  Note: Make adjustment on both operator and nonoperator sides of machine.

  ☐ c. Tighten lockscrew.

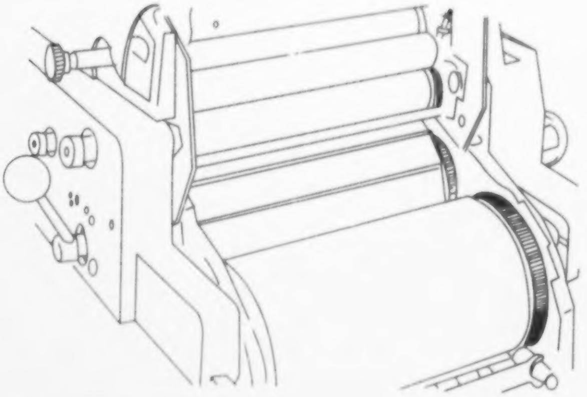
Figure 2



Courtesy of American Type Founders, Inc.

☐ 2. Adjustments to the ink form rollers on Multilith 1250 Offset should only be made by a Multigraphics service representative (Figure 3).

Figure 3



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☐ 3. Adjust the ink form rollers on an A.B. Dick 360 with the following procedures (Figure 4).

   ☐ a. Loosen lock screws (a) on both sides and adjust screws (b) as necessary.

   ☐ b. Upper ink form roller ink stripe should be 1/8" wide.

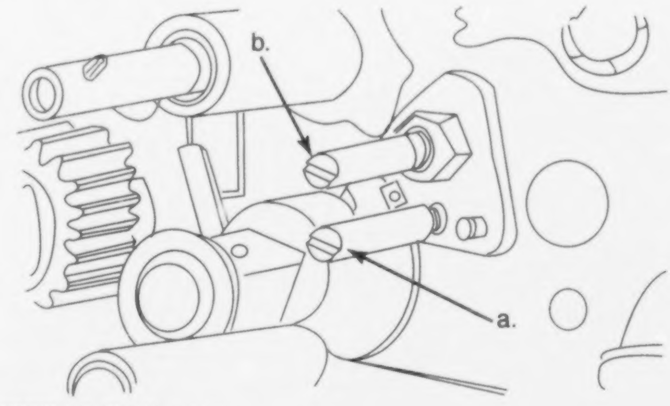
   - Turn screw (b) on operator side of machine in clockwise direction to increase width of stripe.
   - Turn screw (b) on the nonoperator side of the machine in a counterclockwise direction to increase width of stripe.

   ☐ c. Lower ink form roller ink stripe should be 5/32" wide.

   - If lower roller is same size as upper roller, adjust same as steps outlined in 3b.
   - If lower roller is larger than upper roller:
     - Turn screw (b) counterclockwise on operator side of the machine to increase width of stripe.
     - Turn screw (b) clockwise on nonoperator side of the machine to increase width of stripe.

   ☐ d. Tighten lock screws.

Figure 4



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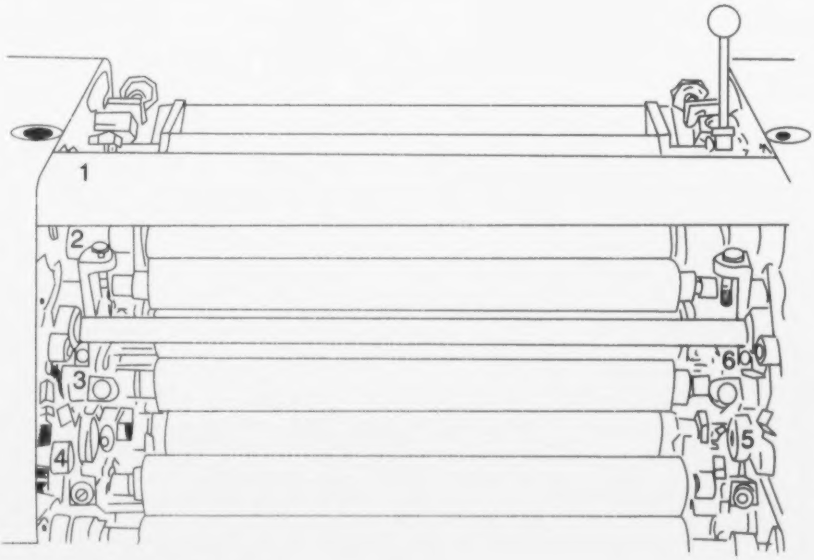
☐ 4. Adjust the ink form rollers on the Heidelberg GTO with the following procedure.

Note: The adjustment of each ink form roller is combined in one adjusting mechanism at each side of the press.

☐ a. Adjust ink form roller Number 1 to the plate on the feeder side of the press with the countersunk screw (5) marked by a white ring (Figure 5).

☐ b. Adjust ink form roller Number 2 with countersunk adjusting screw (6) on the feeder side of the press (Figure 5).

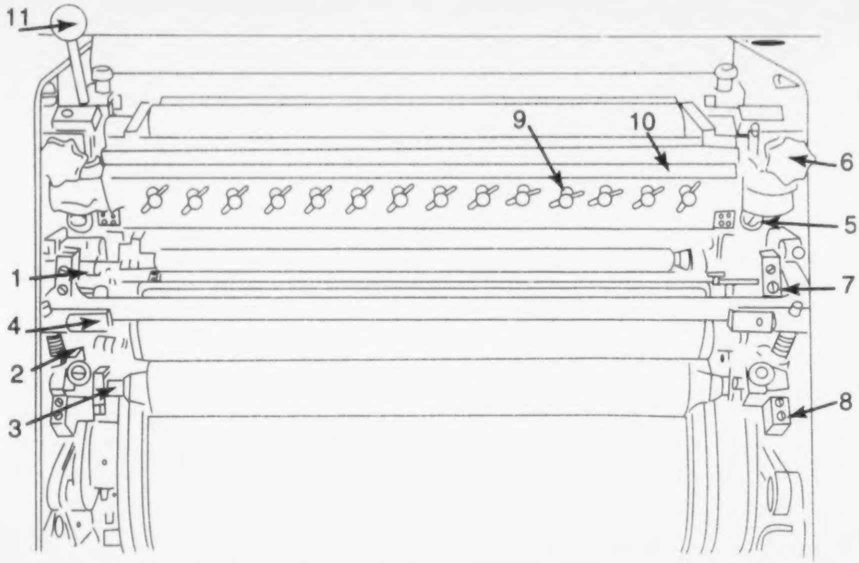
Figure 5



Courtesy of Heidelberg USA, Inc.

☐ c. Adjust ink form rollers Number 3 and Number 4 from the delivery side of the press with adjustment screws (7) and (8) respectively (Figure 6).

Figure 6



Courtesy of Heidelberg USA, Inc.

☐ 5. Adjust ink form rollers on the Itek 975 with the following procedure (Figures 7 and 8).

Figure 7

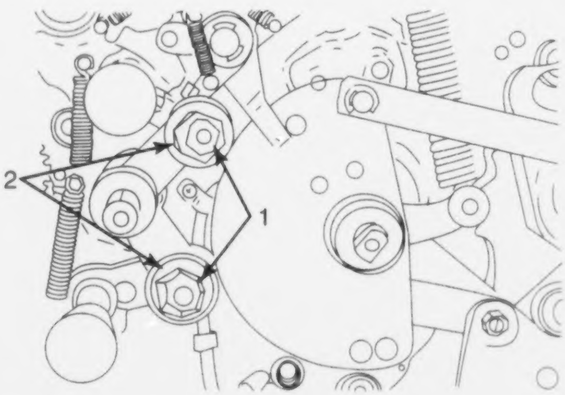


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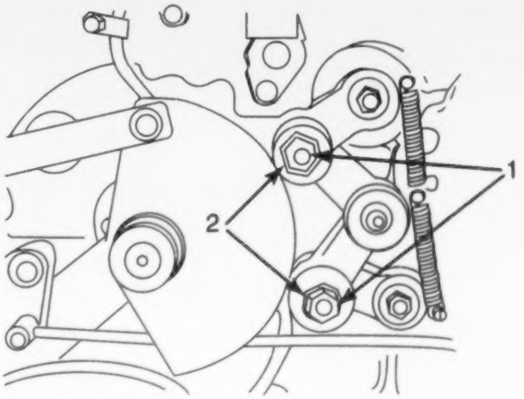
Figure 8



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☐ a. Using a T-wrench, loosen locknuts (1).

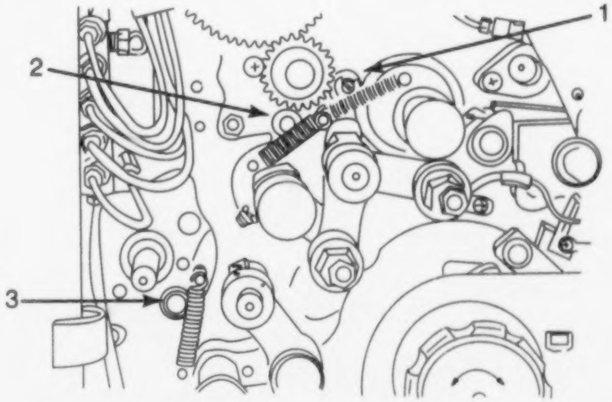
☐ b. Adjust pressure by turning the pressure adjustment nuts (2).

Note: There are two pressure adjustments on both the operator and nonoperator sides of the press.

☐ c. Turn the pressure adjustment nuts in the direction of the arrow marked on the nuts to increase the pressure.

☐ 6. Adjust ink form roller pressure on the Itek 3985 with the following procedure (Figure 9).

Figure 9



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☐ a. Loosen locknuts (1), (2), and (3) and turn the pressure adjustment nuts to increase or decrease pressure.

Note: Pressure adjustments 1, 2, 3 correspond to Number 1, 2, and 3 ink form rollers, and are located on both the operator and nonoperator sides of the press.

☐ b. Turn the adjustment nut in the direction of the arrow marked on the nut to increase pressure.

☐ 7. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ____________________

____

____

Objective 32

Job Sheet 3—Adjust Plate Cylinder to Blanket Cylinder

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

Evaluation Criteria	Rating
• Instructions were followed	______
• Plate cylinder to blanket cylinder adjusted according to operator's manual	______
• Stripe width of 1/8″ obtained	______

Basic Skills

Reading · Critical Thinking · Employability · Technology

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

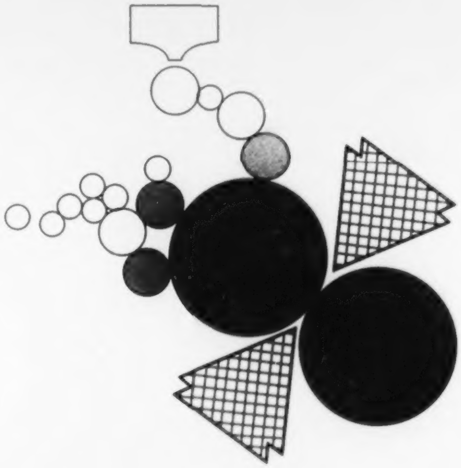
Tools, equipment, and materials

- Screwdriver
- Allen wrench, if required
- Adjustment wrench, if required
- Operator and/or maintenance manual for selected duplicator

Job Sheet 3

Procedure

Figure 1



Note: Some of the basic procedures for adjusting plate cylinder to blanket cylinder are common to several duplicators; depending on the duplicator or duplicators available, your instructor may direct you to complete all or some of the following procedures or use the procedures as guidelines for a selected duplicator; these procedures are adapted from materials published by the 3M Company.

☐ 1. Perform ink stripe checks.

☐ 2. Complete adjustments as required.

☐ 3. Turn the duplicator on and ink up the rest of the plate.

☐ 4. Check to make sure the entire plate is covered, not just the image area; this would not give a proper plate-to-blanket check.

☐ 5. Do not turn on the dampener rollers.

☐ 6. Turn the duplicator off and then gently lower the plate cylinder to the blanket and raise it immediately.

☐ 7. Rotate the blanket cylinder by the handwheel and inspect the ink stripe (should be 1/8" wide).

> Note: The ink stripe should be uniform in width; if it is not, refer to operator manual or maintenance manual for cylinder parallel adjustment or ask instructor to assist.

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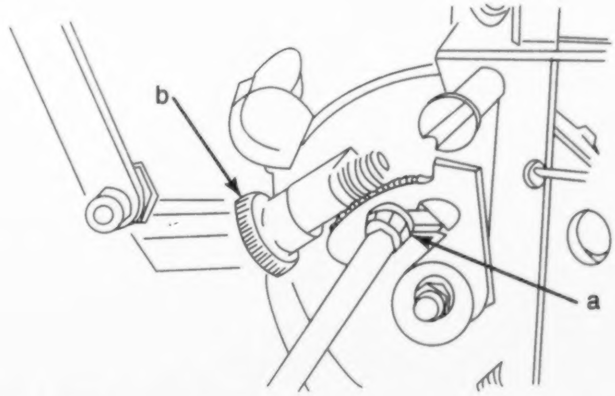
☐ 8. Adjust the plate cylinder on an ATF Chief 15 or Chief 17 with the following procedure (Figure 2).

  ☐ a. Loosen the locking screw (a).

  ☐ b. Turn the plate-to-blanket impression adjusting screw (b) clockwise to increase the width of the stripe or counterclockwise to decrease the width.

  ☐ c. Tighten locking screw (a).

Figure 2

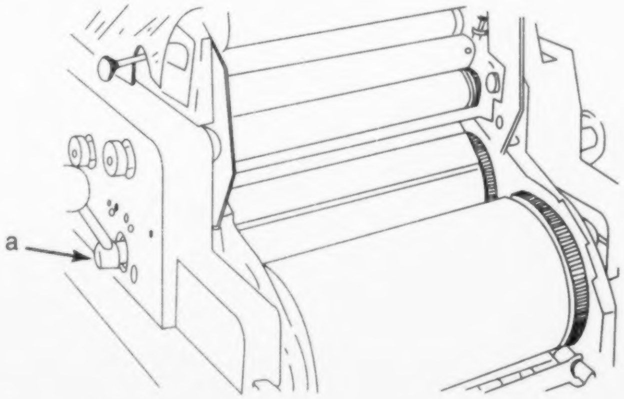


Courtesy of American Type Founders, Inc.

☐ 9. Adjust the plate cylinder on a Multilith 1250 Offset with the following procedure (Figure 3).

- ☐ a. Loosen lock bolt (a) with a T-wrench.
- ☐ b. Move single lever control to left to increase pressure, or to the right to decrease pressure.
- ☐ c. Tighten lock bolt (a).

Figure 3



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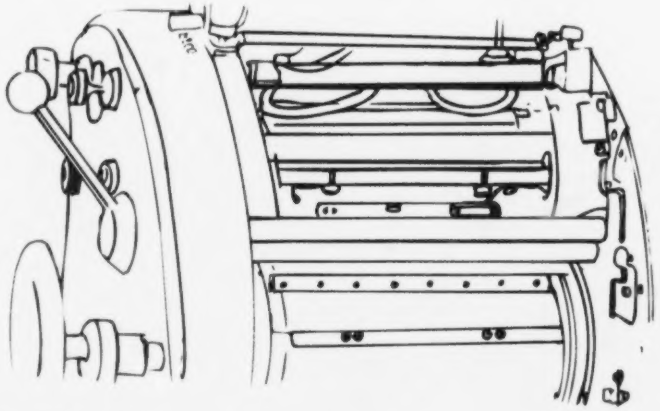
☐ 10. Adjust the plate cylinder on an A.B. Dick 360 only under the careful guidance of your instructor or watch the procedure as it is performed by an A.B. Dick service representative (Figure 4).

Figure 4



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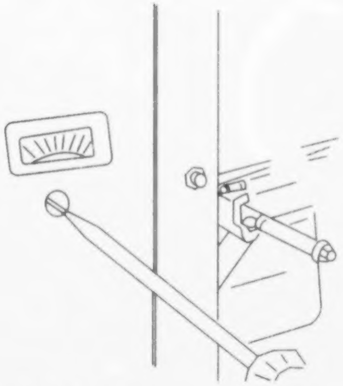
☐ 11. Adjust plate-to-blanket cylinder pressure on Heidelberg GTO by use of paper underlays.

Note: Plate and blanket cylinders on the Heidelberg GTO run with constant bearer-to-bearer pressure which can be adjusted for differing stock thicknesses by use of paper underlays run beneath the blanket. When a .006-inch offset plate is used with the press .075-inch offset blanket, a .040-inch underlay blanket and a .002-inch paper underlay, the pressure will be correct for nearly all jobs. If more pressure is required, additional underlays will be required.

☐ 12. Adjust the plate pressure on the Itek 3985 with the following procedure (Figure 5).

Figure 5



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- ☐ a. Measure plate thickness with a micrometer.
- ☐ b. Using manufacturer's specifications and long screwdriver, set plate pressure dial on operator side of press to match the plate thickness.

☐ 13. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

____

____

Objective 33

Job Sheet 4—Adjust Blanket Cylinder to Impression Cylinder

Name ____________________ Attempt Number ________

Date ____________________ Overall Rating ________

Evaluation Criteria	Rating
• Instructions were followed	______
• Blanket cylinder to impression cylinder properly adjusted according to operator's manual	______

Basic Skills

Reading Critical Thinking Employability Technology

Instructions

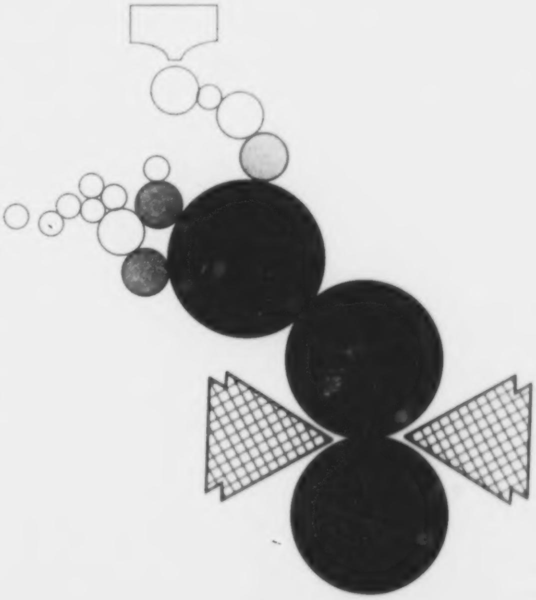
When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Screwdriver
- Allen wrench, if required
- Adjustment wrench, if required
- Operator and/or maintenance manual for selected duplicator

Procedure

Figure 1



Note: Improper blanket cylinder to impression cylinder pressure may result in damaged blankets and poor quality copy, and running heavier than normal stock also requires blanket cylinder to impression cylinder adjustment; depending on the duplicator or duplicators available, your instructor may direct you to complete some or all of the following procedures or use the procedures as guidelines for a selected duplicator; these procedures are adapted from materials published by the 3M Company.

☐ 1. Adjust the blanket cylinder on an ATF Chief 15 or Chief 17 with the following procedure (Figure 2).

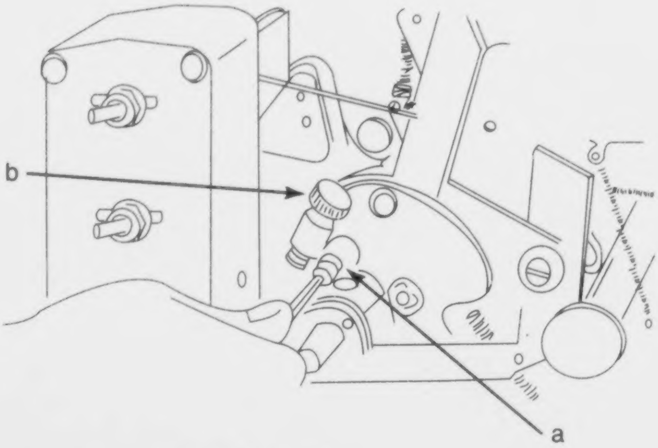
  ☐ a. Loosen locking screw (a).

  ☐ b. Turn the impression adjusting screw (b) toward you until the print obtained is very light.

  ☐ c. Turn the adjusting screw (b) back away from you until the desired impression on the paper is obtained.

  ☐ d. Tighten locking screw (a).

Figure 2



Courtesy of American Type Founders, Inc.

☐ 2. Adjust the blanket cylinder on Multilith 1250 Offset with the following procedure (Figure 3).

  ☐ a. Slide open cover.

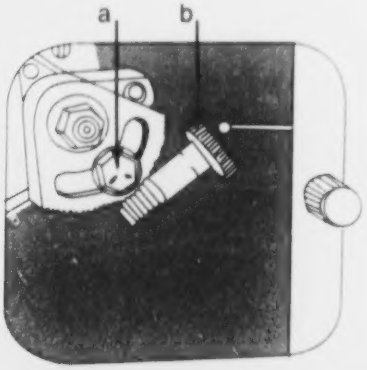
  ☐ b. Loosen clamp screw (a) with T-wrench.

  ☐ c. Turn micrometer adjusting screw (b) clockwise to decrease pressure and counterclockwise to increase pressure.

  ☐ d. Tighten clamp screw.

  ☐ e. Close the cover.

Figure 3



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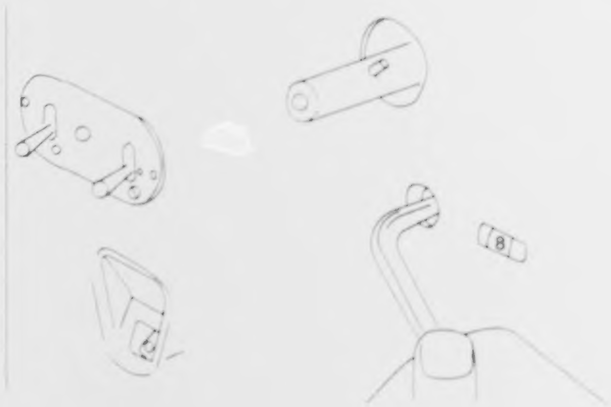
☐ 3. Adjust the impression cylinder gap on an A.B. Dick 360 with the following procedure (Figure 4).

  ☐ a. Insert Allen wrench into the control dial opening.

  ☐ b. Turn the dial to the lower numbers to increase gap and to the higher numbers to decrease gap.

Figure 4



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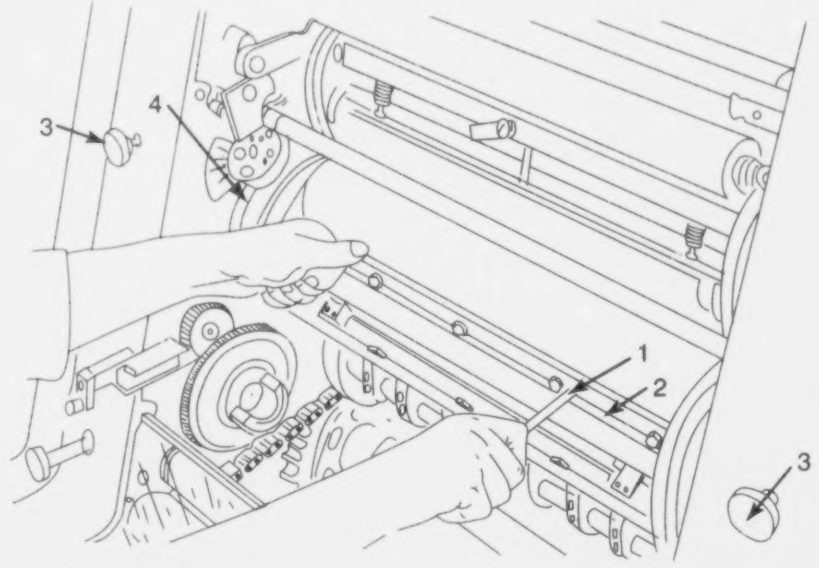
☐ 4. Adjust the pressure between the blanket and impression cylinder on the Heidelberg GTO with the following procedure (Figure 5).

Figure 5

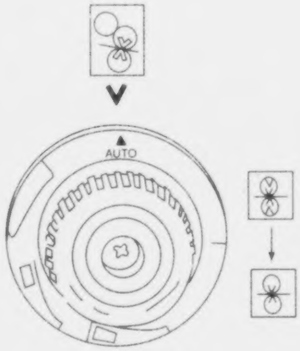


Courtesy of Heidelberg USA, Inc.

- ☐ a. Adjust by using knurled hand discs (3) on drive and operation side of press.
- ☐ b. Settings are shown on graduated scales (4).
- ☐ c. Using operator's manual and knowledge of paper thickness, set both graduated scales to the proper setting by turning the knurled hand discs (3).

☐ 5. Adjust the blanket to impression pressure on the Itek 975 with the following procedure (Figure 6).

Figure 6



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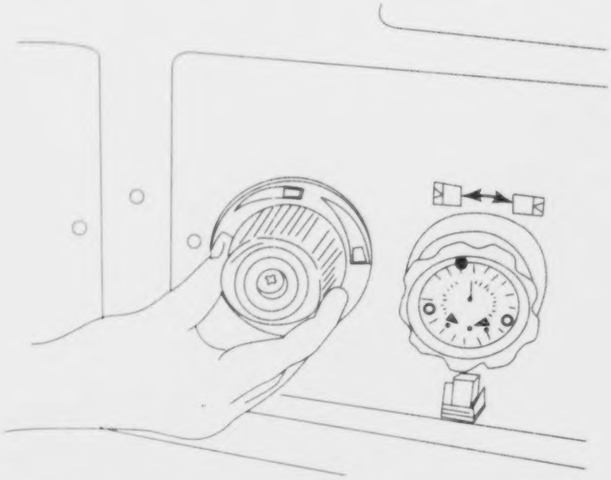
- ☐ a. Set the automatic pressure device to **AUTO**. The blanket to impression cylinder pressure is controlled by springs.
- ☐ b. To use fixed impression pressure, set the dial to the paper thickness (in millimeters).

☐ 6. Adjust the blanket to impression cylinder pressure on the Itek 3985 with the following procedure (Figure 7).

Figure 7



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- ☐ a. Measure paper thickness (in millimeters).
- ☐ b. Adjust impression pressure adjustment dial on operation side of press to match paper thickness.

☐ 7. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

____

____

Objective 34

Job Sheet 5—Change a Molleton Cover

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Roller removed from press and cover removed without damage to roller	______
• Roller surface thoroughly cleaned	______
• New cover placed on roller correctly and roller reinstalled on press	______

Basic Skills

Reading Employability Technology

Introduction

This exercise familiarizes the student with changing a molleton cover, a process encountered frequently in commercial print shops.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- New molleton cover
- Installation sleeve
- Talcum or blanket powder
- Blanket wash
- Roller conditioner-cleaner
- Paper as required

Procedure

☐ 1. Remove roller from press.

☐ 2. Split cover for easy removal from roller.

Caution: Do not cut roller surface.

☐ 3. Clean surface thoroughly with blanket wash and with water and roller conditioner-cleaner to remove all ink and gum.

☐ 4. Complete the change according to one of the following procedures.

  ☐ a. If installation sleeve is available:

  - Slide cover over sleeve.
  - Insert roller inside sleeve.
  - Hold end of cover on end of roller as sleeve is removed.

  ☐ b. If no installation sleeve is available:

  - Coat roller with blanket or talcum powder.
  - Prepare a piece of paper 1 1/2 times the length of the roller and wide enough to wrap around the roller two times.
  - Coat the paper with blanket or talcum powder.
  - Wrap the paper loosely around the roller, leaving 1/3 the length of the roller exposed.
  - Slide the cover over the rolled paper onto the roller until the cover just overlaps the exposed end of the roller.
  - Grasp the cover and roller on the exposed end and pull the rolled paper from between the cover and roller.

☐ 5. Secure cover by pulling drawstrings to overlap cover ends over roller ends.

☐ 6. Soak new cover with fountain solution.

☐ 7. Remove excess moisture from cover by rolling with open palms on top of paper towels on a flat surface.

☐ 8. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

____

____

Objective 35

Job Sheet 6—Degrease Plate and Impression Cylinders

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Instructions were followed	______
• Cylinder cleaned properly with careful use of chemicals	______

Basic Skills

Reading Employability Technology

Introduction

This exercise is aimed at familiarizing the student with cleanup procedures encountered frequently in the commercial world.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Chrome cylinder cleaner
- Degreaser
- Clean cotton pads
- Plate etch

Procedure

☐ 1. Wipe the entire surface of the cylinder being cleaned with chrome cylinder cleaner or degreaser, using a saturated cotton pad.

☐ 2. Apply three coats to the cylinder and rub each coat vigorously.

☐ 3. Wash chrome cylinder cleaner or degreaser off, using a clean cotton pad saturated with water.

☐ 4. Wipe dry.

☐ 5. Wipe the entire surface of the cylinder with a clean cotton pad saturated with etch.

☐ 6. Remove excess etch with a clean, dry cotton pad.

> **Caution**: Cleaners may cause skin irritation; avoid prolonged skin contact and wash hands with soap and a generous quantity of water after using a cleaner.

☐ 7. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

____

____

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Objective 36

Job Sheet 7—Deglaze Ink Rollers and Blanket

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Instructions were followed	______
• Ink rollers and blanket deglazed properly with careful use of chemicals	______

Basic Skills

Reading Employability Technology

Introduction

This exercise is aimed at familiarizing the student with cleanup procedures encountered frequently in commercial print shops.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Deglazer
- Blanket powder
- Roller conditioner-cleaner
- Water miscible cleaner
- Household abrasive cleaner
- Shop towels

Caution: Deglazer and roller conditioner-cleaner are highly flammable. Keep them away from heat or open flame. These solvents can also cause skin irritation, so after using them wash hands immediately with soap and a generous quantity of water.

Procedure

☐ 1. Apply deglazer on both surfaces to be cleaned; be sure to use only a deglazer recommended by manufacturer or supplier.

☐ 2. Follow deglazer with an ink roller conditioner to clean water soluble particles from rollers and blanket as recommended by manufacturer or supplier.

☐ 3. Clean rollers with roller cleaner and blanket wash to remove active ingredients in the deglazer.

☐ 4. Apply blanket powder to the blanket surface, and if an abrasive cleaner is applied, thoroughly rinse the rollers with water until all traces of the cleaner are gone.

Note: To get maximum life from blankets, it is recommended that they be rotated each week, conditioned with blanket powder, and allowed to rest a week before being put back in service. When repeated cleaning of the blanket is necessary, changing the blanket daily is recommended. Blankets on or off the cylinder should be kept away from heat and sunlight, and when they are stored, it should be in a dark, cool place out of direct sunlight and protected from dirt and damage.

☐ 5. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

____

____

Objective 37

Job Sheet 8—Change Blanket

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Blanket properly cleaned and removed with press power unplugged	______
• New blanket installed according to operator's manual and rechecked for tightness	______

Basic Skills

Reading Employability Technology

Introduction

This exercise is aimed at familiarizing the student with a frequently encountered offset press activity.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Allen wrench or specific tool recommended by manufacturer
- New or spare blanket
- Cleaner
- Deglazer
- Blanket powder
- Shop towels
- Cotton pads

Procedure

☐ 1. Unplug power supply to the press.

☐ 2. Clean blanket thoroughly using a standard deglazing procedure.

☐ 3. Remove blanket from cylinder by releasing blanket clamps.

☐ 4. Clean blanket cylinder surface and clamps.

☐ 5. Remove bars, if blanket is attached to cylinder by bars.

☐ 6. Clean bars and attach them to the new blanket.

☐ 7. Wipe surface of old blanket dry.

☐ 8. Apply a liberal quantity of blanket powder to a cotton pad and gently pat the entire surface of the old blanket, adding additional blanket powder to the cotton pad as required.

☐ 9. Rub the powder gently into the entire blanket surface.

☐ 10. Make sure the backing is clean and dry, then roll the old blanket with the rubber side in.

Note: Placing a sheet of plain, clean paper over the rubber before rolling will further protect the blanket surface.

☐ 11. Place old blanket in its original carton so that when stored it will be in a horizontal position.

☐ 12. Attach new blanket to cylinder in reverse order of removal.

☐ 13. Adjust new blanket so that tension is applied uniformly across the entire width and length of the blanket.

Note: Over-tightening will cause the blanket surface to become uneven, and if the blanket is too loose, copy quality will suffer, usually causing a ghost image on finished copy; always follow the manufacturer's recommendations for blanket installation.

☐ 14. After running a few hundred copies, retighten blanket at trailing edge.

☐ 15. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

____

____

Objective 38

Job Sheet 9—Backflush Vacuum Pump

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Vacuum lines disconnected and pump correctly backflushed according to operator's manual	______
• Vacuum lines reattached correctly and pump checked for proper operation	______
• Date of service marked on maintenance record	______

Basic Skills

Reading Employability Technology

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Adjustable wrench
- Press operator's manual
- Container of solvent and oil mixture (provided by instructor)

Procedure

Caution: Many presses are currently equipped with carbon-vane pumps which require no backflushing. Be certain your press is not equipped with one of these newer pumps before proceeding with backflushing operation. Backflushing a carbon-vane pump can cause major damage to its internal parts.

☐ 1. Using operator's manual and instructor's guidance, follow steps to disconnect air and vacuum lines from pump.

☐ 2. Follow operator's manual instructions to inject flushing mixture into and out of the pump.

☐ 3. Reconnect air and vacuum lines.

☐ 4. Wipe pump and pump surroundings to clean any spilled solvent/oil mixture.

☐ 5. Fill pump oil reservoir according to manufacturer's specifications.

☐ 6. With instructor's guidance, run press to test pump and integrity of vacuum lines and connections.

☐ 7. Mark date of pump service on maintenance log.

☐ 8. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

____

____

Job Ticket and Cost Awareness

Unit Contents

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Information Sheet 5-5

Student Supplements

1—Sample Printing/Material Price Sheet 5-13
2—Sample Job Schedule 5-15
3—Sample Material Cost Sheet 5-17

Assignment Sheet

1—Estimate Costs of Printing Jobs 5-19

Objective Sheet

Unit Objective

After completing this unit, the student should be able to determine printing job costs, and be familiar with how a job ticket is used to conduct a printing job from start to finish. The student should demonstrate these competencies by completing the assignment sheet and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to cost awareness with their definitions.
2. List fixed and variable costs of a printing job.
3. List cost items to consider when giving an estimate on a printing job.
4. Select from a list cost awareness factors for a successful printing business.
5. Select proper practices for waste management in the printing shop.
6. State the definition of a job ticket.
7. Select from a list the components of a job ticket.
8. Select true statements concerning printing trade customs.
9. Estimate costs of printing jobs. (Assignment Sheet 1)

Information Sheet

Objective 1

Terms and definitions

a. **Benchmark**—A fixed time that a job is estimated to take in each phase

Example: An example of a benchmark would be to print 6,000 sheets an hour on an A.B. Dick 360 press.

b. **Estimate**—A detailed statement of all costs and charges related to a printing job

c. **Fixed cost**—Any cost that does not change with production volume, such as rent or utilities

d. **Gross profit**—The amount of revenue left after direct printing costs have been paid

e. **Invoice**—The bill for the customer's printing job

f. **Labor**—That part of the cost which is an hourly wage rate paid to employees working on the job

g. **Markup**—A predetermined percentage added to the job price to recover combined expenses and profit

h. **Materials**—The consumable items required for the printing job, such as paper, ink, plates, etc.

i. **Net profit**—The amount of revenue left after all costs, fixed and variable, have been paid

j. **Quotation**—The actual selling price of the printing job, quoted and recorded

k. **Variable cost**—Any cost that increases or decreases directly with production volume, such as paper, ink, and film

Objective 2

Fixed and variable costs of a printing job

a. Fixed costs

- Insurance
- Advertising
- Taxes
- Building rental
- Utilities
- Maintenance

b. Variable costs

- Labor
- Paper
- Ink
- Plates
- Film

Objective 3

Cost items to consider when giving an estimate on a printing job

Note: Estimate software programs are available such as Franklin Estimating, Logic, and Hagen Systems, Inc.

a. Typesetting

Note: Most print shops use computerized page-layout programs for typesetting purposes.

b. Scanning

c. Graphic design

d. Line negatives

e. Halftone negatives

f. Plates

g. Press runs

h. Ink

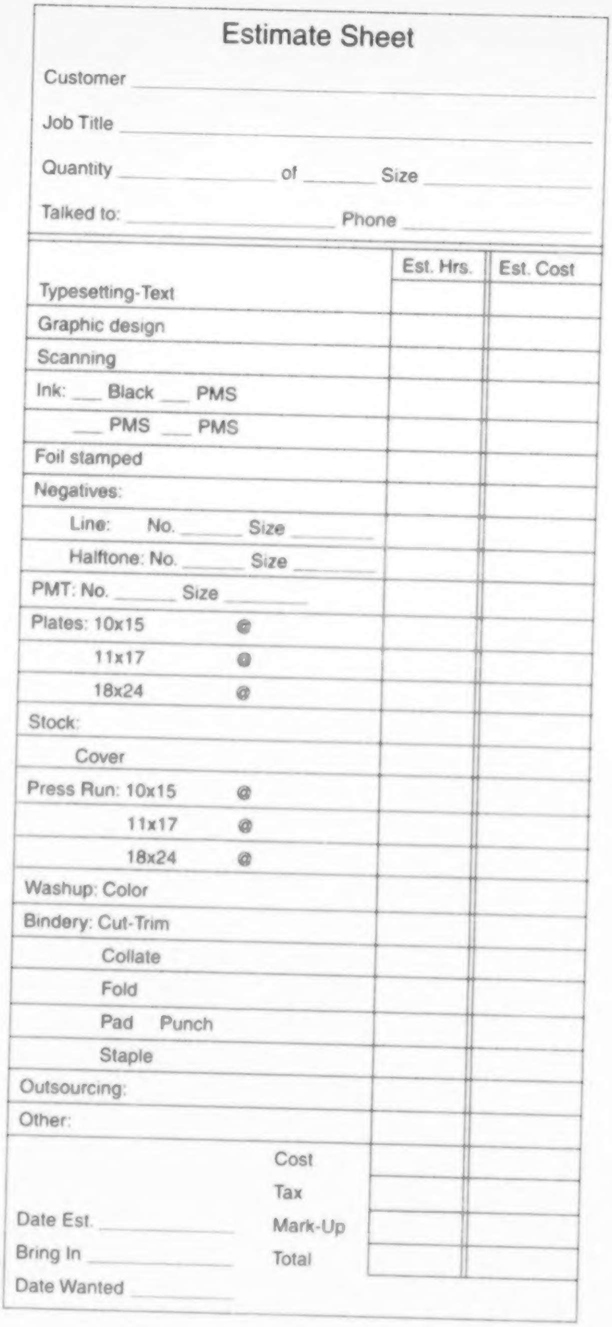
i. Bindery charges

j. Paper stock

k. Labor

l. Outsourcing

Figure 1



Estimate Sheet

Customer ____________________

Job Title ____________________

Quantity __________ of ______ Size __________

Talked to: ______________ Phone __________

	Est. Hrs.	Est. Cost
Typesetting-Text		
Graphic design		
Scanning		
Ink: ___ Black ___ PMS		
___ PMS ___ PMS		
Foil stamped		
Negatives:		
Line: No. ______ Size ______		
Halftone: No. ______ Size ______		
PMT: No. ______ Size ______		
Plates: 10x15 @		
11x17 @		
18x24 @		
Stock:		
Cover		
Press Run: 10x15 @		
11x17 @		
18x24 @		
Washup: Color		
Bindery: Cut-Trim		
Collate		
Fold		
Pad Punch		
Staple		
Outsourcing:		
Other:		
Cost		
Tax		
Mark-Up		
Total		

Date Est. __________

Bring In __________

Date Wanted __________

Information Sheet

Objective 4

Cost awareness factors for a successful printing business

Note: See Student Supplement 3 for a sample material cost sheet that shows the effect waste has on profits.

a. Net profit

Note: Net profit is the key to success and survival of a business.

b. Markup

Note: Markup should be designed to produce the required net profit.

c. Wages and salaries

d. Cost of equipment (depreciated annually)

e. Sales

f. Production quality

g. Waste management

Objective 5

Waste management practices

a. Recycling

- Save plates and negatives for silver and aluminum reclamation.
- Save hole punch waste for paper recycling.
- Pad trim waste for scratch pads or sell for recycling.

b. Shop planning

- Plan bulk paper cuts carefully to avoid waste.
- Schedule press runs to take advantage of setup and press wash time.

Note: Common wisdom and experience have taught us waste is expensive, and can quickly eat into net profits. For years, for instance, it could have been said correctly that buying bulk paper and cutting it to fit various jobs—being careful to use as much of the paper as possible without waste—was the most efficient use of paper inputs.

Technology, however, can change even the most basic ground rules. For instance, the increasing popularity of office copy machines has created a tremendous demand for 8 1/2 x 11 copy paper bound in reams. With this demand has come volume production and a corresponding drop in prices because of efficiency of manufacturing large quantities of the paper.

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One printer recently gave the example of a customer ordering 8,000 6 x 9 sheets of scratch paper, for which he had bulk paper that could have been cut with NO waste. The price he had to charge would have been TEN TIMES as much as using 8,000 sheets of 8 1/2 x 11 copy paper and wasting part of the top and side of each sheet!

This is not an endorsement of waste, but it is an example of why the astute printer must be aware of all costs and alternatives. The market place continues to change and so do the people who stay in business! Know your costs and use that knowledge to your benefit.

Objective 6

Job ticket—The formal, written specification sheet which serves as a blueprint for the printing job and follows a job from order taking to delivery

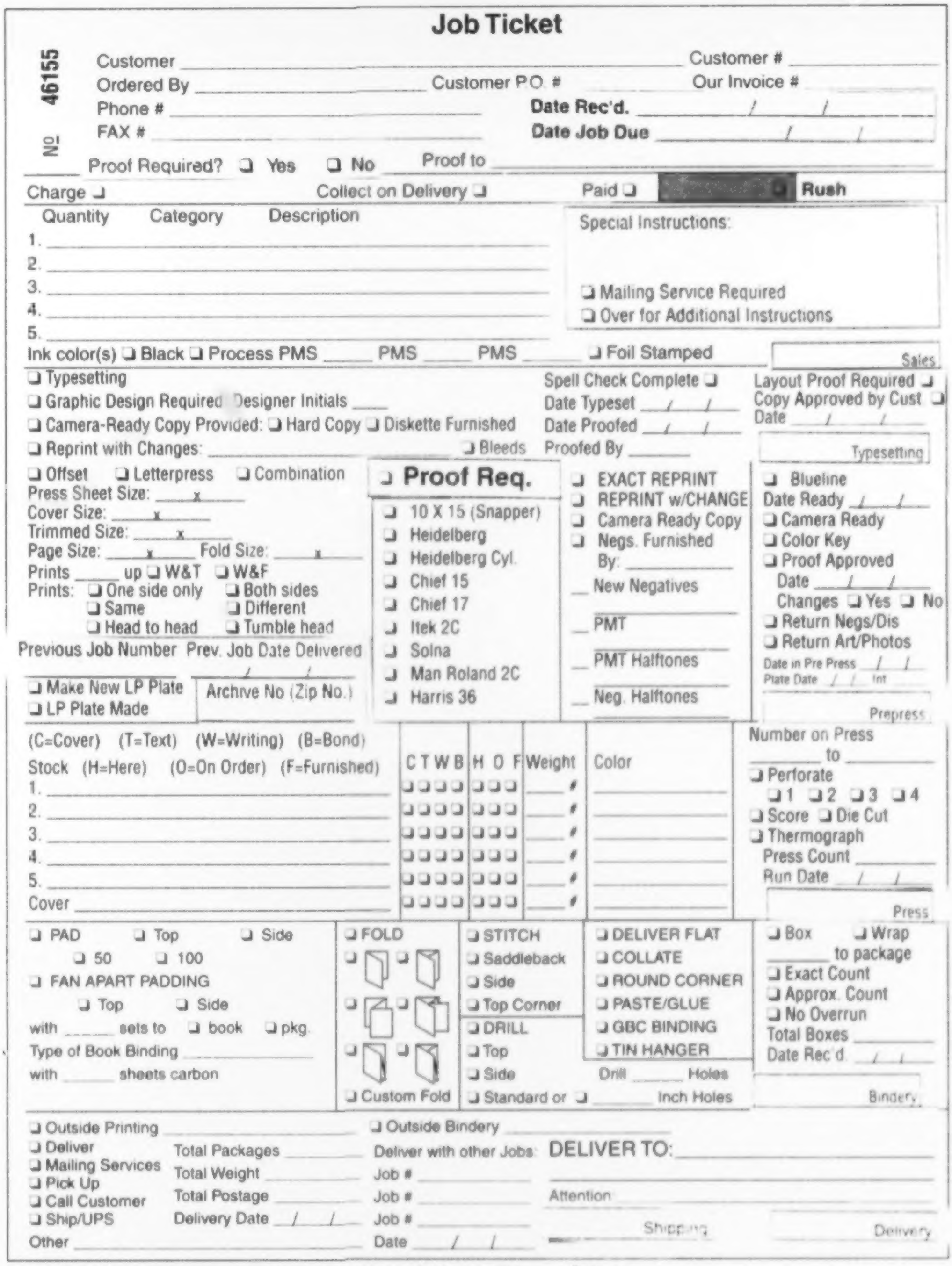
Note: A good job ticket should carry all the information necessary for the various stations of the shop to complete their work and move the job from prepress stages through the bindery and on to the customer delivery. In many shops, a job ticket consists of a manual envelope containing all or some of the following items: camera-ready artwork, photos, halftones, negatives, digital file(s), samples of the job from previous printing, and any other instructions or materials needed to complete the job.

Information Sheet

Objective 7

Components of a job ticket

Figure 2



Job Ticket

No. 46155

Customer ____________ Customer # ________
Ordered By ________ Customer P.O. # ________ Our Invoice # ________
Phone # ________ **Date Rec'd.** ___/___/___
FAX # ________ **Date Job Due** ___/___/___

____ Proof Required? ☐ Yes ☐ No Proof to ____________

Charge ☐ Collect on Delivery ☐ Paid ☐ [redacted] ☐ **Rush**

Quantity Category Description
1. ____________
2. ____________
3. ____________
4. ____________
5. ____________

Special Instructions:
☐ Mailing Service Required
☐ Over for Additional Instructions

Ink color(s) ☐ Black ☐ Process PMS ____ PMS ____ PMS ____ ☐ Foil Stamped

Sales

☐ Typesetting
☐ Graphic Design Required Designer Initials ____
☐ Camera-Ready Copy Provided: ☐ Hard Copy ☐ Diskette Furnished
☐ Reprint with Changes: ____________ ☐ Bleeds

Spell Check Complete ☐
Date Typeset ___/___/___
Date Proofed ___/___/___
Proofed By ______

Layout Proof Required ☐
Copy Approved by Cust ☐
Date ___/___/___

Typesetting

☐ Offset ☐ Letterpress ☐ Combination
Press Sheet Size: ____ x ____
Cover Size: ____ x ____
Trimmed Size: ____ x ____
Page Size: ____ x ____ Fold Size: ____ x ____
Prints ____ up ☐ W&T ☐ W&F
Prints: ☐ One side only ☐ Both sides
☐ Same ☐ Different
☐ Head to head ☐ Tumble head
Previous Job Number ________ Prev. Job Date Delivered ___/___/___
☐ Make New LP Plate
☐ LP Plate Made
Archive No (Zip No.)

☐ **Proof Req.**
☐ 10 X 15 (Snapper)
☐ Heidelberg
☐ Heidelberg Cyl.
☐ Chief 15
☐ Chief 17
☐ Itek 2C
☐ Solna
☐ Man Roland 2C
☐ Harris 36

☐ EXACT REPRINT
☐ REPRINT w/CHANGE
☐ Camera Ready Copy
☐ Negs. Furnished
By: ________
__ New Negatives
__ PMT
__ PMT Halftones
__ Neg. Halftones

☐ Blueline
Date Ready ___/___/___
☐ Camera Ready
☐ Color Key
☐ Proof Approved
Date ___/___/___
Changes ☐ Yes ☐ No
☐ Return Negs/Dis
☐ Return Art/Photos
Date in Pre Press ___/___/___
Plate Date ___/___/___ Int ____

Prepress

(C=Cover) (T=Text) (W=Writing) (B=Bond)

Stock (H=Here) (O=On Order) (F=Furnished)	C T W B	H O F	Weight	Color
1. ________	☐ ☐ ☐ ☐	☐ ☐ ☐	____ #	________
2. ________	☐ ☐ ☐ ☐	☐ ☐ ☐	____ #	________
3. ________	☐ ☐ ☐ ☐	☐ ☐ ☐	____ #	________
4. ________	☐ ☐ ☐ ☐	☐ ☐ ☐	____ #	________
5. ________	☐ ☐ ☐ ☐	☐ ☐ ☐	____ #	________
Cover ________	☐ ☐ ☐ ☐	☐ ☐ ☐	____ #	________

Number on Press
______ to ______
☐ Perforate
☐ 1 ☐ 2 ☐ 3 ☐ 4
☐ Score ☐ Die Cut
☐ Thermograph
Press Count ______
Run Date ___/___/___

Press

☐ PAD ☐ Top ☐ Side
☐ 50 ☐ 100
☐ FAN APART PADDING
☐ Top ☐ Side
with ____ sets to ☐ book ☐ pkg.
Type of Book Binding ________
with ____ sheets carbon

☐ FOLD
☐ ☐
☐ ☐
☐ ☐
☐ Custom Fold

☐ STITCH
☐ Saddleback
☐ Side
☐ Top Corner
☐ DRILL
☐ Top
☐ Side
☐ Standard or ☐ ____ Inch Holes

☐ DELIVER FLAT
☐ COLLATE
☐ ROUND CORNER
☐ PASTE/GLUE
☐ GBC BINDING
☐ TIN HANGER
Drill ____ Holes

☐ Box ☐ Wrap
____ to package
☐ Exact Count
☐ Approx. Count
☐ No Overrun
Total Boxes ______
Date Rec'd. ___/___/___

Bindery

☐ Outside Printing ________ ☐ Outside Bindery ________
☐ Deliver
☐ Mailing Services
☐ Pick Up
☐ Call Customer
☐ Ship/UPS
Other ________

Total Packages ______
Total Weight ______
Total Postage ______
Delivery Date ___/___/___

Deliver with other Jobs:
Job # ______
Job # ______
Job # ______
Date ___/___/___

DELIVER TO: ____________
____
Attention ____________

Shipping

Delivery

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BEST COPY AVAILABLE

Objective 8

Printing trade customs

Note: The following customs are examples of what one may observe in the printing trade; different printers may add to or amend these customs.

a. Orders—Regular orders cannot be cancelled unless an agreement to cover the printer's loss has been made.

b. Experimental work—Experimental work will carry a charge.

Examples: Sketches, drawings, electronic prepress, plates

c. Sketches, dummies, negatives, and plates—Remain exclusive property of printer unless otherwise agreed to in writing.

d. Alterations—Changes made by the customer will carry an additional charge.

e. Approval of proofs—Printer is not responsible for errors if work is completed with customer's approval.

f. Press proofs—An extra charge will be made if a delay on the press results from awaiting customer's approval of press proofs.

g. Color proofing—Because of differences in equipment and conditions, a reasonable variation in color between color proof and the completed job shall constitute an acceptable delivery.

h. Quantities—Overruns or underruns of up to 10% shall constitute an acceptable delivery; excess or deficiency shall be charged or credited to the customer.

i. Customer's property—Customer shall be charged for handling and storing personal paper stock or printed matter held over thirty days; all property is stored at customer's risk.

j. Delivery—Unless otherwise specified, price is quoted on a single shipment, F.O.B. customer's local place of business; estimates are based on continuous and uninterrupted delivery of completed order.

k. Terms—Net cash within thirty days unless otherwise specified; claims must be made within five days of receipt of goods.

l. Delays in delivery—All agreements are contingent upon fires, strikes, accidents, wars, floods, or other causes beyond printer's control.

m. Paper stock furnished by customer—All paper stock shall be properly packaged, free of dirt, tears, and be of proper specifications; if not, delays in production shall be charged to the customer.

Student Supplement 1—Sample Printing/Material Price Sheet

Film Prices	
9 x 12 or less	$1.50
Larger than 9 x 12	$3.00
12 x 18	$3.50

Plate Prices	
10 x 15 'E'	$1.50
10 x 15 'M'	$2.00
11 x 18 'M'	$2.50
11 x 18 ½ 'M'	$2.50

Composition	(Simple)	(Complex)
5 ½ x 8 ½	$5.25	$7.00
8 ½ x 11	$9.50	$14.50
Business cards	$4.00	$5.00
Letterheads	$5.25	$7.50
Envelopes	$4.00	$5.25
Ruled forms (5 ½ x 8 ½)	$12.00	$15.00
Ruled forms (8 ½ x 11)	$15.00	$20.00

Reprints (Plate on file)
$3.50 + Stock + 30%
Stock Furnished
Add all charges + 30%, then subtract stock cost.
Colors
Add $3.50 for second color.
Add $9.00 for additional colors.

Pictures	
Halftones 5 x 7 or less	$4.00
Halftones larger than 5 x 7	$5.00

*Outside printing is priced at material cost plus 30%.
*Charge for posters and handbills on the basis of simple composition.

Collating
$.65 per hundred sheets
$.35 per hundred sheets (over 1M)
Folding
$.15 per hundred sheets
Stitching
$.03 per book or set
Padding
$.15 per pad

Student Supplement 1

Press Prices

The following rates are based on jobs printed on 8 1/2 x 11, 20 lb bond with black ink.

	100 copies	500 copies	1000 copies
Printing 1 side	$48.07	$59.12	$72.62
Printing 2 sides	$94.25	$109.61	$128.16

Paper Prices

Note: Paper prices change daily.

Bond	**8 1/2 x 11**	**8 1/2 x 14**
20 lb white	$1.20 per hundred	$1.40 per hundred
20 lb colors	$1.50 per hundred	$1.70 per hundred
2 reams or more	$4.80 per ream	$5.20 per ream

Index	**8 1/2 x 11**
110 lb white	$1.70 per hundred
110 lb colors	$1.80 per hundred

Carbonless	**8 1/2 x 11**	**8 1/2 x 14**
2-part	$24.00 (500 sets)	$28.00 (500 sets)
3-part	$42.00 (500 sets)	$49.00 (500 sets)
4-part	$60.00 (500 sets)	$68.00 (500 sets)

Scott Offset	**8 1/2 x 11**	**11 x 17**
70 lb white	$1.40 per hundred	$1.80 per hundred
70 lb colors	$1.70 per hundred	$2.10 per hundred
60 lb white	$1.30 per hundred	$1.60 per hundred
60 lb colors	$1.70 per hundred	$1.90 per hundred

Student Supplement 2—Sample Job Schedule

Note: The job schedule is used to track the progress of a job through the various areas of the print shop.

Student Supplement 2

Job Schedule

Customer:
Address:

Phone:
Description:

RECEIVE MATERIALS

	Due In	Actual In
Separations		
Artwork		
Disk		
Comp Film		

PREP WORK

	Due In	Hours
Scanning		
Stripping		

PROOFING

	Due Out	Due In
Laser		
Iris		
Blueline		
Matchprint		

STOCK

	Ordered	Due In
Stock 1		
Stock 2		
Stock 3		
Stock 4		
Stock 5		

PRESS

	On Press	Hours
Press Run 1		
Press Run 2		
Press Run 3		
Press Run 4		
Press Run 5		
Press Run 6		
Press Run 7		
Press Run 8		
Press Run 9		
Press Run 10		

Quote Number:
Job Number:
Date:
Revision Date:

SPECIAL PRESS INFORMATION (OUT OF TOWN CLIENT)

BINDERY

	Due In	Hours
Cutting		
Letter Press		
Folding		
Fold/Glue		
Stitching		
Shrinkwrap		
Hand Work		
Other		

OUTSIDE SERVICES

	Due Out	Due In
Outside Printing		
Outside Bindery		

SCHEDULE

Art	Due Out	Due In
Proof	Due Out	Due In
Print		
Bind		
Samples		
Partial		
Final Delivery		

Student Supplement 3—Sample Material Cost Sheet

Job No. ____________

Materials	**Quantity**	**Spoilage**	**Unit Cost**	**Totals**
Misc. Materials				
Film				
Dylux Paper				
Plates				
Ink				
Paper				
Bindery				
Total				

Remarks ____

____

____

Estimated Job Cost: ____________________________

Total Labor Cost: ____________________________

Spoilage: ____________________________

Actual Job Cost: ____________________________

Profit: ____________________________

Loss: ____________________________

Objective 9

Assignment Sheet 1—Estimate Costs of Printing Jobs

Name ______________________ Overall Rating __________

Date ______________________

Evaluation Criteria	Rating
• Directions were followed	______
• Prices accurately calculated	______

Basic Skills

Reading Mathematics

Directions

Using the Franklin Offset Catalog provided by the instructor or the material costs in Student Supplement 1, calculate the shop prices of the jobs below.

1. Calculate the total charge of 2,000 simple letterheads, 8 1/2 x 11, white 60 lb Scott offset, one color ink.

Answer $ ______________________________

2. Calculate the total charge of 5,000 handbills (circulars), 6 x 9, medium quality, black ink on white 60 lb offset.

Answer $ ______________________________

Unit Contents

Student Components

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Information Sheet 6–5

Assignment Sheets

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2—Use the Formula to Determine How Many Sheets Will Be Required 6–15
3—Calculate a Combination Cut Using Stock Cutting Formula 6–17
4—Draw a Cutting Diagram 6–19

Job Sheet

1—Cut Carbonless Paper 6–21

Objective Sheet

Unit Objective

After completing this unit, the student should be able to calculate the most efficient method of cutting paper for a given job and accomplish the cutting in a safe manner. The student should demonstrate these competencies by completing the assignment sheets and job sheet and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to calculating paper cutting with their definitions.
2. Select true statements concerning safety rules for operating a paper cutter.
3. State the purpose of jogging paper before cutting.
4. List the two types of paper cutters.
5. Describe two techniques for cutting carbonless paper.
6. State the formula for cutting paper stock.
7. State the formula for determining the number of sheets to be cut for a printing job.
8. State the formulas for making a combination cut.
9. Use the formula for cutting paper stock. (Assignment Sheet 1)
10. Use the formula to determine how many sheets will be required. (Assignment Sheet 2)
11. Calculate a combination cut using stock cutting formula. (Assignment Sheet 3)
12. Draw a cutting diagram. (Assignment Sheet 4)
13. Cut carbonless paper. (Job Sheet 1)

Information Sheet

Objective 1

Terms and definitions

a. **Carbonless paper**—Paper coated or impregnated with chemicals to yield an image when pressure is applied

b. **Combination cut**—Second cut, made in stock cutting, when grain direction is not a factor, and additional pieces can be cut from the waste of the first cut

c. **Cutting diagram**—Proportional drawing which maps the most cost-efficient method of cutting sheets for a given job

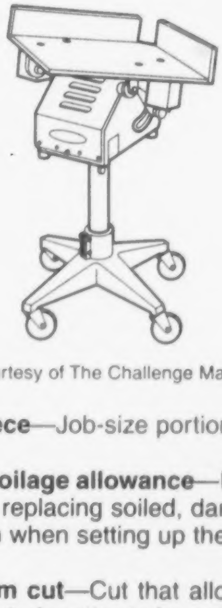
d. **Jogging**—Handling of sheets to make a neat, evenly piled stack (done by hand or mechanically with a vibrating jogging table)

e. **Jogging boards**—Wooden tools or blocks used to move or adjust lifts of paper on paper cutter so as to avoid accidentally placing hands or fingers in the way of the cutting blade

f. **Lift**—Stack of paper being cut or handled

g. **Mechanical jogging table**—Device used to vibrate sheets into neat lifts

Figure 1



Courtesy of The Challenge Machinery Company

h. **Piece**—Job-size portion cut from the full-size sheet

i. **Spoilage allowance**—Percentage of extra sheets added to the total job for replacing soiled, damaged, or misprinted sheets and for samples to run when setting up the press

j. **Trim cut**—Cut that allows for actual outside dimensions of a piece of printed matter to be cut after printing is completed

Information Sheet

Objective 2

Safety rules for operating a paper cutter

a. Check the safety bolt and brake action on powered cutters before each work session.

b. Never disable two-hand controls.

c. Never reach under the knife to remove scrap or straighten a lift—use jogging boards.

d. Never attempt to catch a falling stack of cut stock during the cutting cycle—use a backup board.

e. Keep the cutter and surrounding floor area free of tools, paper, and shop towels.

f. Avoid distractions while operating the cutter.

g. Helpers and other shop personnel must stand clear of the cutter during cutting cycles.

h. All knives and cutting sticks are to be changed according to machine's operating manual.

i. Keep all spare knives bolted to mounting boards.

j. Always turn off power to cutter before leaving the machine unattended.

Objective 3

Purpose of jogging paper before cutting—To ensure that all sheets of paper are cut the same size

Objective 4

Types of paper cutters

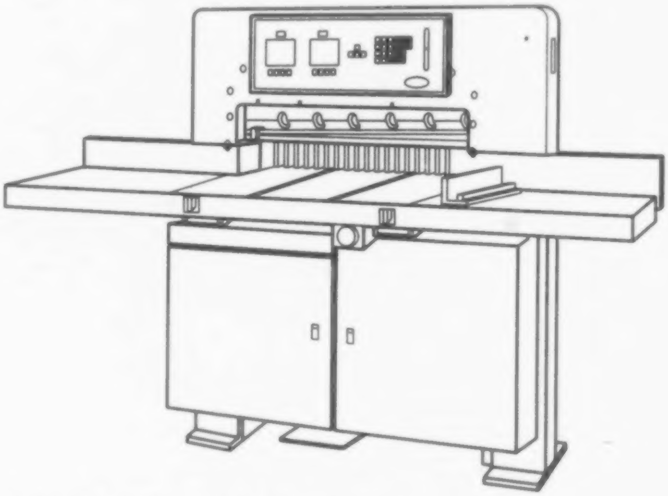
a. Hand-lever paper cutter

Note: Hand-lever paper cutters are becoming obsolete.

b. Electric or electro-hydraulic power cutter

Note: Modern paper cutters feature hydraulic clamping and cutting with computerized memory systems.

Figure 2



Courtesy of The Challenge Machinery Company

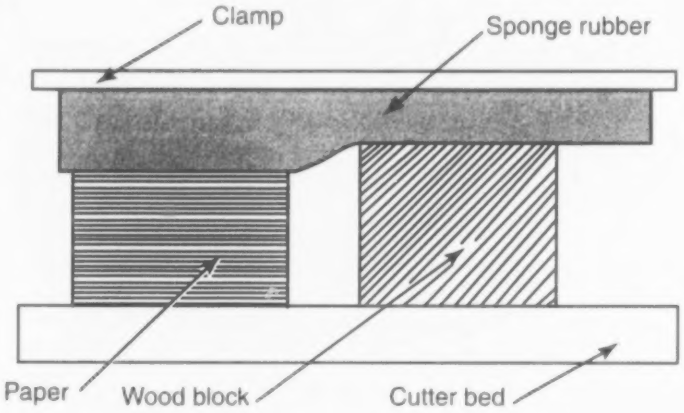
Objective 5

Techniques for cutting carbonless paper

Note: Because carbonless paper is coated or impregnated with chemicals to allow imaging when sharp pressure is applied, careful handling during the printing, binding, and finishing processes must be ensured. A paper cutter's clamp exerts enough force to spoil carbonless paper unless techniques are used to prevent imaging.

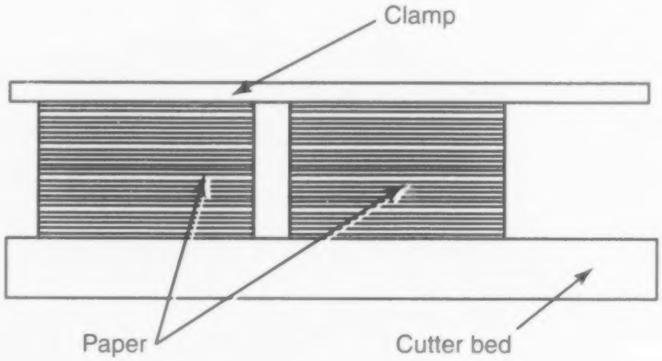
a. Use a wood block and sponge buffer.

Figure 3


Clamp
Sponge rubber
Paper
Wood block
Cutter bed

b. Cut two or more lifts at one time.

Figure 4


Clamp
Paper
Cutter bed

475

Objective 6

Formula for cutting paper stock

$$\frac{\text{Dimensions of Sheet}}{\text{Dimensions of Piece to Be Cut}} = \text{Number of Pieces Cut From Sheet}$$

Example: How many $8^1/_2 \times 11$ pieces can be cut from a 17×22 sheet?

a. $\dfrac{17 \times 22}{8\,^1/_2 \times 11}$ $\begin{matrix}\text{Dimensions of Sheet}\\ \text{Dimensions of Piece}\end{matrix}$

b. Divide vertically 8 $^1/_2$ into 17 = 2

c. Divide 11 into 22 = 2

d. Multiply the two answers from steps b and c.

Answer: 2 x 2 = 4

Objective 7

Formula for determining number of sheets to be cut for a printing job

$$\frac{\text{Desired Number of Pieces}}{\text{Number of Pieces Obtained From One Sheet}} = \text{Total Number of Sheets Needed}$$

Example: How many 17 x 22 sheets will be needed to cut 1,000 pieces of 8 $^1/_2$ x 11?

a. $\dfrac{1000}{4}$ $\begin{matrix}\text{Desired Number of Pieces}\\ \text{Number of Pieces Cut From One Sheet}\end{matrix}$

b. Divide 4 into 1,000 = 250

Answer: 250 sheets will need to be cut to produce 1,000 pieces.

Note: An extra sheet must be cut any time there is a remainder when dividing number of pieces into number of sheets.

Objective 8

Formulas for making a combination cut

Note: A combination cut is made when additional pieces can be cut from the waste of the first cut, and when grain direction is not a factor.

a. $\dfrac{\text{Dimensions of Sheet}}{\text{Dimensions of Piece to Be Cut}} = \text{Number of Pieces Cut From Sheet}$

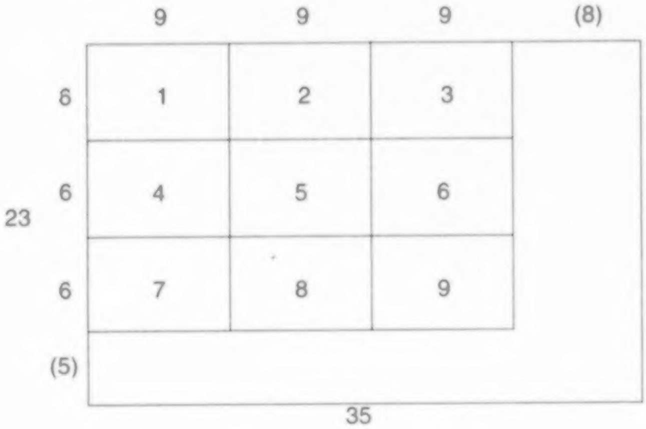
b. After measuring waste, calculate:

$$\frac{\text{Waste Portion}}{\text{Dimensions of Piece to Be Cut}} = \text{Number of Pieces Obtained}$$

Example: How many 6 x 9 pieces can be cut from one 23 x 35 sheet?

Cut a. $\frac{23 \times 35}{6 \times 9} = 3 \times 3 = 9$

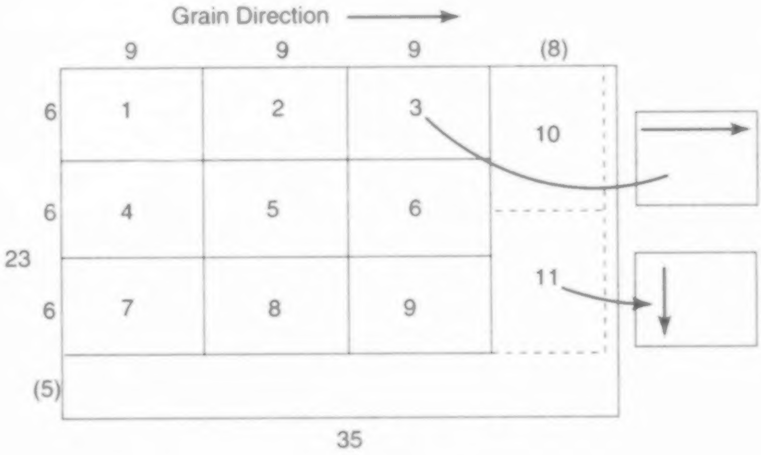
Figure 5


9
9
9
(8)
6
6
6
(5)
23
35
1
2
3
4
5
6
7
8
9

$\frac{8 \times 23}{6 \times 9} = 1 \times 2 = 2$

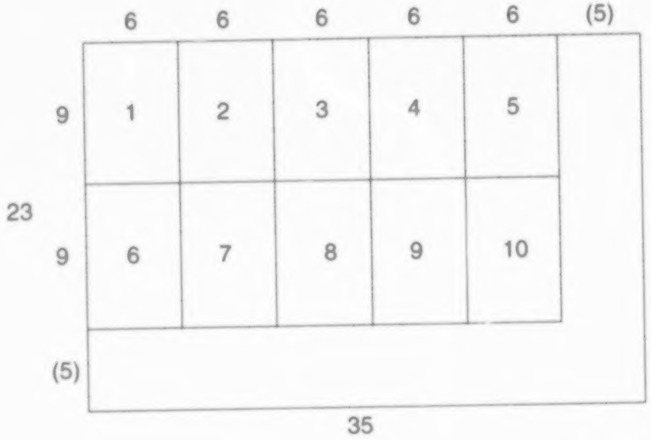
9 + 2 = 11 Pieces From Two Cuts

Figure 6


Grain Direction
9
9
9
(8)
6
6
6
(5)
23
35
1
2
3
4
5
6
7
8
9
10
11

Cut b. $\frac{23 \times 35}{9 \times 6} = 2 \times 5 = 10$ Pieces

Figure 7



Note: One of the waste portions in cut **a** is large enough to accommodate one of the dimensions of the piece size, 6 x 9. Thus, dividing 6 x 9 into the waste portion, 8 x 23, we find that two more pieces can be obtained for a total of 11 pieces. If grain direction were a factor, cut **b** producing 10 pieces would have been the best cut.

Objective 9

Assignment Sheet 1—Use the Formula for Cutting Paper Stock

Name ______________________ Overall Rating __________

Date ______________________

Evaluation Criteria	Rating
• Directions were followed	______
• Math work was shown	______
• Answers provided along with accurate diagram	______

Basic Skills

Reading Mathematics Critical Thinking

Directions

Using the formula for cutting paper stock, answer the following questions.

1. Using the formula for cutting paper stock, determine how many 6 x 9 pieces can be cut from a 25 x 38 sheet. Show two answers and draw the cutting diagram for the best of the two.

   a. ______________________

   b. ______________________

   c. Diagram of best:

Assignment Sheet 1

2. Using the formula when sheet size has fractions, determine how many 4 x 6 pieces can be cut from a $22^{1}/_{2}$ x $28^{1}/_{2}$ sheet and show cutting diagram.

   Note: When fractions are part of only the sheet size, this fraction simply becomes part of the waste, and need not be calculated.

   a. Number of pieces = ____________________

   b. Diagram:

3. Using the formula when piece size has fractions, find the largest number of $2^{1}/_{2}$ x $5^{1}/_{2}$ pieces that can be cut from a 23 x 35 sheet.

   Note: When piece size has fractions, convert to decimals and calculate.

   a. Number of pieces = ____________________

Objective 10

Assignment Sheet 2—Use the Formula to Determine How Many Sheets Will Be Required

Name ______________________________ Overall Rating __________

Date ______________________________

Evaluation Criteria	**Rating**
• Directions were followed	______
• Math work was shown	______
• Answers were correct	______

Basic Skills

Reading Mathematics Critical Thinking

Directions

Using the formula determine how many sheets will be required in the following:

1. First determine how many $3^1/_2$ x $5^1/_2$ pieces can be cut from a sheet of 22 x 28.

   Answer: ______________________________

2. Now determine how many sheets will need to be cut to produce 1,000 pieces.

   Answer: ______________________________

Objective 11

Assignment Sheet 3—Calculate a Combination Cut Using Stock Cutting Formula

Name ______________________ Overall Rating __________

Date ______________________

Evaluation Criteria	**Rating**
• Directions were followed	______
• Diagrams drawn correctly	______

Basic Skills

Reading

Mathematics

Critical Thinking

Directions

Find out how many 4 x 6 pieces can be cut from a 23 x 35 sheet. Draw cutting diagrams for both cuts and determine how many additional pieces can be cut from waste of first cut, assuming grain direction is not a factor.

1. Number of pieces = ______________________
2. Cutting diagrams:
    a.

    b.
3. Additional number of pieces = ______________

Objective 12

Assignment Sheet 4—Draw a Cutting Diagram

Name ______________________ Overall Rating __________

Date ______________________

Evaluation Criteria	Rating
• Directions were followed	______
• Diagrams properly drawn	______
• Answer correctly entered on diagram	______

Basic Skills

Reading

Mathematics

Directions

Using a sheet of $20\frac{1}{2} \times 24\frac{3}{4}$ index stock, a T-square, a ruler or pica line gauge, and a No. 2 pencil, draw a cutting diagram.

1. Determine how many 4 x 6 pieces can be cut from the $20\frac{1}{2} \times 24\frac{3}{4}$ sheet.

   Answer: ______________________

2. Draw the exact cutting diagram on the $20\frac{1}{2} \times 24\frac{3}{4}$ sheet, showing where each cut will be made.

3. Number the pieces to be obtained on the diagram.

Objective 13

Job Sheet 1—Cut Carbonless Paper

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Accurate, clean cut achieved	______
• No imaging present on cut paper	______

Basic Skills

Reading Employability Technology

Introduction

This exercise is aimed at familiarizing the student with the frequently encountered assignment of cutting carbonless paper.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Supply of carbonless paper sheets (provided by instructor)
- Paper cutter
- Wood block
- Sponge rubber buffer

Procedure

☐ 1. Jog paper.

☐ 2. Using jogging boards, position carbonless paper against back guide of paper cutter and left side housing.

☐ 3. Place wooden block adjacent to lift and cover both with sponge rubber buffer.

Note: Take care to keep buffer out of the knife's path.

☐ 4. Adjust clamp to hold lift firmly beneath sponge rubber buffer.

☐ 5. Turn cutter power "ON."

☐ 6. Following safety rules, make the cut.

☐ 7. Remove lift, block, and sponge rubber buffer from cutter.

☐ 8. Turn cutter power "OFF."

☐ 9. Examine cut lift with instructor and discuss results.

☐ 10. Clean cutter area of waste paper made in cut.

☐ 11. Return tools and materials to proper storage.

Evaluator's Comments: ______________________________

____

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Unit Contents

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3—Drill Paper Stock for a 3-Ring Binder 7–17
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5—Hand Fold, Collate, and Staple a Booklet 7–21
6—Score a Job 7–23

Objective Sheet

Unit Objective

After completing this unit, the student should be able to accomplish basic binding and finishing techniques such as folding, padding, drilling, and stitching jobs in the print shop. The student should demonstrate these competencies by completing the job sheets and by scoring a minimum of 85 percent on the written test.

Specific Objectives

After completing this unit, the student should be able to:

1. Match terms related to binding and finishing with their definitions.
2. Select true statements concerning binding techniques.
3. List major folding styles.
4. List processes associated with finishing activities.
5. Pad 20-pound stock. (Job Sheet 1)
6. Pad carbonless paper. (Job Sheet 2)
7. Drill paper stock for a 3-ring binder. (Job Sheet 3)
8. Fold paper using a folding machine. (Job Sheet 4)
9. Hand fold, collate, and staple a booklet. (Job Sheet 5)
10. Score a job. (Job Sheet 6)

Information Sheet

Objective 1

Terms and definitions

a. **Binding**—Securing pages together by means of wire, thread, adhesive, plastic, etc.

b. **Collating**—Gathering, arranging in order, and checking several sheets to make a book

c. **Finishing**—Final bindery work, such as die cutting, embossing, flocking, foil stamping, laminating, or varnishing

d. **Inserting**—Placing one signature, sheet, or folded sheet inside another

e. **Jogging**—Vibrating paper by machine or by hand to make sure all sheets line up evenly at the edges

f. **Marrying sets**—Joining collated sets when number of pages exceeds collator capacity

g. **Padding**—Binding a booklet or multi-page job using an adhesive padding compound

h. **Perforating**—Partially cutting a sheet in a broken line so it can easily be torn away

Examples: Ticket stubs; postage stamps

i. **Scoring**—Creasing a sheet mechanically or manually to enable it to fold easily

j. **Stitching**—Binding pages of a book together using wire stitches or staples

k. **Tipping**—Applying a small amount of adhesive to the edge of a sheet so it can be attached to another

l. **Trimming**—Cutting the edges of a bound book to make them even

Note: This is the last major operation in book binding.

Objective 2

Binding techniques

a. Adhesive binding

- Used when less durable, inexpensive binding is preferred, such as in paperback book assembly
- In simplest form called padding

b. Edition binding

- Consists of several signatures sewn together with thread, reinforced with glue and mounted between end sheets and hard covers
- Used when books are expected to undergo hard use and need extra protection and strength
- Top quality books are given extra support by adding a muslin backing cloth over the glue

c. Loose-leaf binding—Gathering and punching for placement in a reusable binder

Example: 3-ring binder

d. Perfect binding—Consists of sawing signatures at the folded edge, applying flexible glue to the rough back edge and attaching cover while glue is wet

Note: Some high-quality periodicals such as *National Geographic* use this method of binding without staples.

e. Plastic binding—Sheets are punched with rectangular slots and held in place by a plastic "comb"

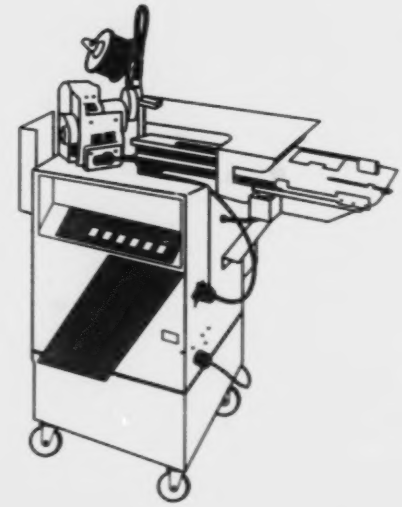
Examples: Technical manuals and other publications which open flat and allow easy removal of binder to add or change pages

f. Stitching

- Side stitching—Placing wire staples or stitches through sides of sheet to bind into book form
- Saddle stitching—Placing wire staples or stitches through the folded, gathered sheets to bind into book form

  Note: Many inexpensive pamphlets, brochures, club cookbooks, and school directories use side stitching, while saddle stitching is a popular binding technique found on many magazines.

Figure 1—Stitching machine

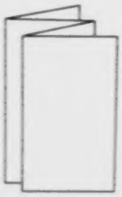


Objective 3

Major paper folding styles

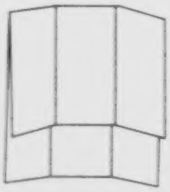
a. Accordion fold

Figure 2



b. Broadside fold

Figure 3



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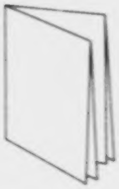
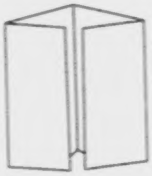
c. French fold

Figure 4



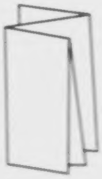
d. Gate fold

Figure 5



e. Letter fold

Figure 6



f. Map fold

Figure 7

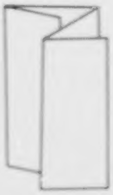


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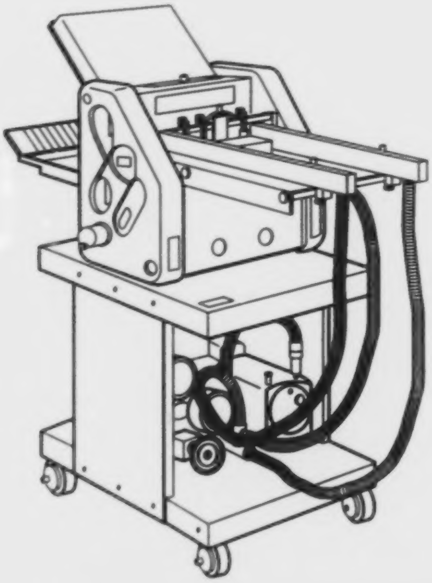
Figure 8—Folder with portable stand



Courtesy of The Challenge Machinery Company

Objective 4

Processes associated with finishing activities

a. Embossing—Pressing sheet between two dies, one raised and one lowered, to form a raised (embossed) image

b. Flocking—Forcing tiny fibers into a wet ink image to add an unusual texture to image area

c. Foil stamping—An embossing process by which a sheet of metallic foil is pressed against paper stock using an electrically-heated brass die to stamp a metallic image in the shape of the die

d. Laminating—Applying a protective plastic coating over the finished piece

e. Varnishing—Applying a protective varnish coating over the finished piece

Student Supplement 1—The "Bindery" in the Computer Age

Throughout this unit you will be introduced to the fundamental activities of the bindery, the various methods of binding books and pamphlets, the numerous ways of folding pages for binding, and some of the basic finishing processes provided by most full-service printing operations.

While these activities are the "basics" of binding and finishing and must be mastered, it is interesting to note the tremendous advancements in the "bindery" based on automation and computer technology.

Walk into any of the nation's increasingly popular bookstores and look at all of the different papers, card stock, wrapping and packaging techniques used to "add value" to the printed word. From shrink-wrapped box sets of related books, to full-color laser prints and marbleized, pebbled, die-stamped cards, calendars and wall posters, all of the eye-catching things you see were designed in the art department and accomplished either at the end of the printing press or in the bindery.

Technological advances in computerized electronics have made available bindery equipment which can automatically count, bundle, load and unload, fill boxes, stack pallets, unstack pallets, automatically jog stacks of paper, fold, glue and address orders—all as supplemental procedures at the delivery end of the printing press.

Magazine publishers make use of "Selectronic Binding," a computer-driven process by which magazines with differing editions (based on demographic data entered in the subscription base) are assembled on the press with articles and advertisements aimed at specific readers. Once those issues have been assembled and are still on the press, the cover passes through an ink-jet assembly which "sprays" the correct address and Zip Code on a mailing label and is wrapped around the issue as it completes its press run. The magazine is then perfect bound and dropped on a conveyor chain to be deposited in a mailing bin for shipping to the correct mail drop point. This "bindery" activity involves people from the advertising department, the marketing department, editorial writers and production personnel all designing and preparing the final product for readers with specific interests. None of these benefits could occur, however, without the computer-assisted press and bindery functions.

Although one might picture the "bindery" as a quiet, dimly-lit warehouse where workers glue, fold and stitch paper and cardboard, in reality the modern bindery is one of the most sophisticated parts of the publishing industry, benefiting from the latest in computer driven electro-mechanical devices. In fact, without these latest in bindery services, most periodicals and trade magazines would be unable to compete in today's fast-paced and tight-margin marketplace.

So, as you work through this unit, realize you are learning the fundamentals of a dynamic part of the printing business—one which offers many careers downstream from the printing press.

Objective 5

Job Sheet 1—Pad 20-Pound Stock

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Paper evenly trimmed	______
• Padding compound evenly and neatly applied	______

Basic Skills

Reading Employability Technology

Introduction

This exercise will familiarize the student with bindery fundamentals such as jogging, trimming, and gluing.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- 100 sheets of scrap 20-lb stock (provided by instructor)
- 2 pieces of chipboard (provided by instructor)
- Padding compound
- Padding brush
- Jogger
- Padding press

Procedure

☐ 1. Trim paper and chipboard to same size.

☐ 2. Count 50 sheets of 20-lb stock and insert chipboard divider, then count another 50 sheets and insert second divider.

☐ 3. Place entire stack into jogger, turn on jogger until all sheet and divider edges are even.

☐ 4. Place stack in padding press with top edge of sheets lined up with front edge of padding press.

☐ 5. Put clamp or weight on stack and lock in place.

☐ 6. Using brush, apply thin even coat of padding compound to exposed edge; brush from the middle of sheet to outside edges.

☐ 7. Allow sufficient drying time, then apply second coat, heavier than first.

☐ 8. When dry, remove from press and turn in to instructor for evaluation.

☐ 9. Clean work area; return tools and materials to proper storage.

Evaluator's Comments: ______________________________

____

____

Objective 6

Job Sheet 2—Pad Carbonless Paper

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Padding compound applied evenly and dried sufficiently	______
• Sets properly stuck together, with each set free from adjoining sets	______

Basic Skills

Reading Employability Technology

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- 25 two-part sets of carbonless paper (provided by instructor)
- Padding press
- Jogger
- Padding brush
- Padding compound (for carbonless paper)

Procedure

☐ 1. Place paper in jogger and jog until edges are even.

☐ 2. Place stack in padding press and line top edge with front of padding press.

☐ 3. Put clamp or weight on stack and lock in place.

☐ 4. Using brush, apply several soaking coats of padding compound to exposed edge, brushing from middle out.

☐ 5. Allow sufficient drying time, feeling edge with fingers, until completely dry.

☐ 6. Take stack out of padding press and, holding opposite edge from padded end, fan apart with hand.

Note: Sets should stick together, but each set should be free from the adjoining sets.

☐ 7. Turn in to the instructor for evaluation.

☐ 8. Clean work area; return tools and materials to proper storage.

Evaluator's Comments: ______________________________

____

____

497

Objective 7

Job Sheet 3—Drill Paper Stock for a 3-Ring Binder

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Student followed directions	______
• Holes properly placed and completely punched	______

Basic Skills

Reading Employability Technology

Introduction

This exercise will familiarize the student with the bindery fundamentals of drilling paper stock.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Paper drill
- 25 sheets of 8$^1/_2$ x 11 paper (provided by instructor)
- Punched or marked guide for 3-ring binder

Procedure

☐ 1. Set back stop on paper drill for depth of holes on inside edge of sheet.

☐ 2. Set guide stops on paper drill, using marked or punched guide for 3-ring binder, to set distance between holes.

☐ 3. Jog sheets to be drilled and position on paper drill for first hole.

☐ 4. Set left side guide and make first hole.

☐ 5. Reset left side guide and line up with back stop setting for second hole.

☐ 6. Drill second hole.

☐ 7. Reset left guide and line up with back stop setting for third hole.

☐ 8. Drill third hole.

☐ 9. Turn in sheets to instructor for evaluation.

☐ 10. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ______________________________

____

____

Objective 8

Job Sheet 4—Fold Paper Using a Folding Machine

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Student followed directions	______
• Folds made neatly and accurately	______

Basic Skills

Reading Employability Technology

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Shop folding machine
- 20 sheets of $8^{1}/_{2}$ x 11 paper (provided by instructor)

Procedure

☐ 1. After instructions by instructor on operation and adjustment of folder, set banks according to machine instructions for a simple 4-page fold.

☐ 2. Load five sheets of paper into the folder bank.

☐ 3. With the instructor's permission, turn on power to folder, and run the five sheets.

☐ 4. Turn off folder.

☐ 5. Submit five folded sheets to instructor for evaluation.

☐ 6. Repeat steps **1** through **5** for 6-page fold, 6-page accordion fold, and 8-page accordion fold (depending upon the capabilities of folding machine).

☐ 7. Clean work area; return tools and equipment to proper storage.

Evaluator's Comments: ______________________________________

____

____

Objective 9

Job Sheet 5—Hand Fold, Collate, and Staple a Booklet

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	**Rating**
• Forms accurately collated in proper numerical order	______
• Staples inserted according to instructions	______

Basic Skills

Reading Employability Technology

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- Multi-page printing job to be assembled and stapled (side stitched or saddle stitched) as a booklet
- Stapler, manually or electrically operated
- Jogging machine

Procedure

☐ 1. Being mindful of page numbers and order, hand fold each form to be used in booklet.

☐ 2. Assemble (collate) forms in numerical page order and jog until even.

☐ 3. Set staple machine for side stitch or saddle stitch (depending upon preference of the instructor and capabilities of the machine).

☐ 4. Individually place booklets into stapler and insert staples according to instructor's directions.

☐ 5. Stack finished booklets neatly and turn in to instructor for evaluation.

☐ 6. Clean work area; return tools and materials to proper storage.

Evaluator's Comments: ______________________________

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Objective 10

Job Sheet 6—Score a Job

Name ______________________ Attempt Number ________

Date ______________________ Overall Rating ________

Evaluation Criteria	Rating
• Scoring head set according to job specifications	______
• Stock neatly scored as specified	______

Basic Skills

Reading Employability Technology

Introduction

This exercise will familiarize the student with the bindery fundamental of scoring stock according to specifications.

Instructions

When you are ready to perform this task, ask your instructor to observe the procedure and rate your performance using the evaluation criteria.

Tools, equipment, and materials

- 20 sheets of medium to heavy stock (provided by instructor)
- Offset press equipped with scoring head or scoring machine

Procedure

☐ 1. In the case of press-mounted scoring head, set according to instructor's directions for your particular press run. In the case of a separate scoring machine, adjust to paper size and scoring position required.

☐ 2. With instructor's permission, make press run, or pass the job through the scoring machine.

☐ 3. Turn off power to press or scoring machine.

☐ 4. Turn in sheets to instructor for evaluation.

☐ 5. Clean work area; return tools and materials to proper storage.

Evaluator's Comments: ______________________________

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